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THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:
ELECTRO-PLATERS REVIEW
Entered as second class matter February 10, 1903, at the post-office at New York under the Act of 1879.
A MONTHLY JOURNAL RELATING TO THE METAL AND PLATING TRADES

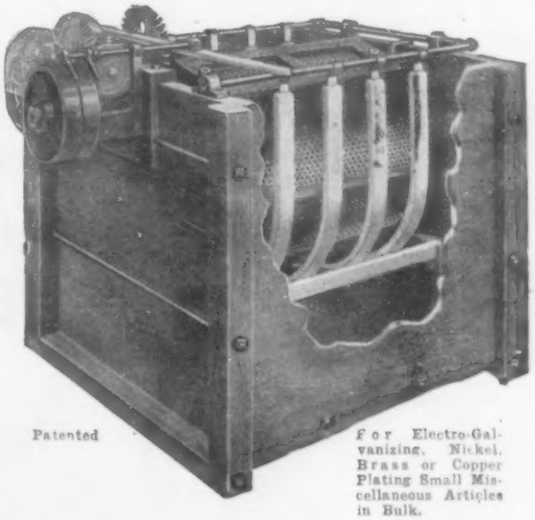
Alternating Rotating Feature
Found Only in National Barrel

NATIONAL
ALTERNATING-ROTATING PLATING BARREL

FACTS

It is reasonable to expect that material rotated in a plating drum will be more evenly exposed to the plating elements and any nesting tendency of the material avoided, if the actuation of such cylinder is reversed every eight revolutions than when rotated continuously in one direction only—consequently effect heavier and more uniform coating of the material in less time.

It is equally reasonable to expect that the gentle agitation created thereby will prevent such solution from becoming impoverished or pocketed—consequently more uniformly maintain the chemical and electrical equilibrium of the bath.



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For Electro-Galvanizing, Nickel, Brass or Copper Plating Small Miscellaneous Articles in Bulk.

Other "National" mechanical features include: self-aligning bearings to facilitate removal and replacement of cylinder; no center shaft; cathode conductors within cylinder placed so that material rests directly thereon; automatic current cutout switch; general cylinder formation to make it impossible for articles to stick during plating; and countershaft for speed reduction, usually required, made unnecessary.

You owe it to yourself to investigate.

Electro Galvanizing Solutions, Dynamos, Anodes, Etc.

NATIONAL GALVANIZING & PLATING EQUIPMENT CORPORATION
Manufacturers and Patentees
Sales Office: 52 Broadway, New York, N. Y.

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IS THE ONLY LOGICAL
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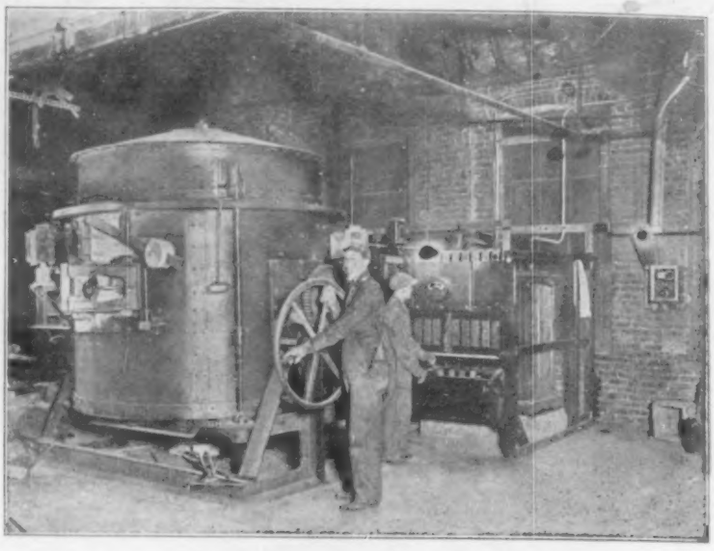

105 K.W. Tilting Type for Melting Brass and Other Non-Ferrous Metals.

Baily Furnaces
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"The best brass furnaces in existence" are built in the following sizes: 105 K.W., 300, 600, 1,000, and 1,500 K.W.

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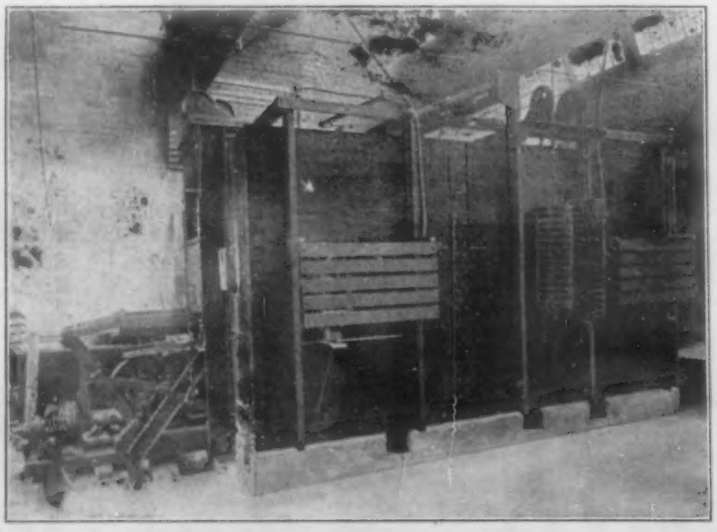

150 K.W. Automatic Pusher Type for Heat Treating.

Types We Make

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Tilting Type Hearth Furnace for melting Copper, Brass, Aluminum, Zinc and Bronze.
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Automatic Control Type Continuous—For Heat-Treating Steel Castings and Forgings.
Car Type for Annealing Steel, Copper, Brass and Aluminum.

THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:

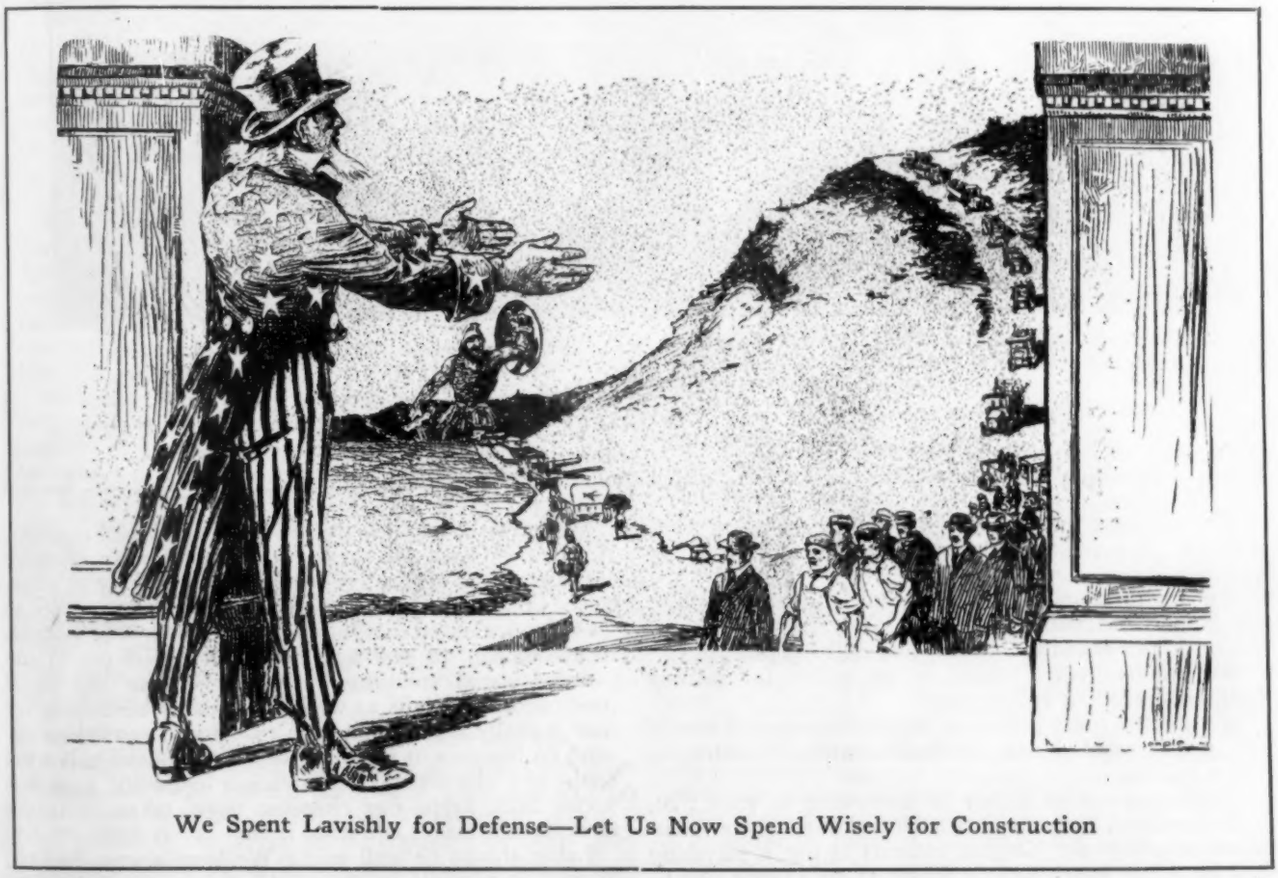
ELECTRO-PLATERS REVIEW

Vol. 17 NEW YORK, MAY, 1919 No. 5

RECONSTRUCTION DAYS

A Brief Analysis of Present Business Conditions and a Forecast of the Future with Respect to Foreign Trade

The business world today is practically marking time and a general feeling of hesitation and lack of confidence is in evidence. Business men are doubtful as to the effect of the treaty of peace, now ready to be signed, upon the world trade in general and on the export field in particular, and as to the nature and effect on business of impending changes from war to peace policies of the Federal Government. So far as one general cause for current conditions can be discerned, however, it is a reluctance on the part of both the consuming public and the business community to buy in excess of immediate needs, because of the anticipation of a possible decline in prices.



We Spent Lavishly for Defense—Let Us Now Spend Wisely for Construction

HIGH PRICES AND THEIR CAUSE.

The chief reason for our general high level of prices all over this country today is the same as existed in 1849, the year of the gold rush to California. A relatively large supply of currency, a relatively small supply of goods or commodities and a great need of commodities. In the last four and a half years the whole civilized world has been destroying commodities and increasing currency. Naturally the prices of commodities measured in currency have gone up and the price of currency measured in commodities has gone down.

The economic history of the world clearly shows that in all similar circumstances the decline of commodity

prices has been a much slower process than currency inflation, and in no case in modern history has the level of commodity prices even returned to the level at which it stood when the inflation of the currency began. As Professor Irving Fisher of Yale University recently said:

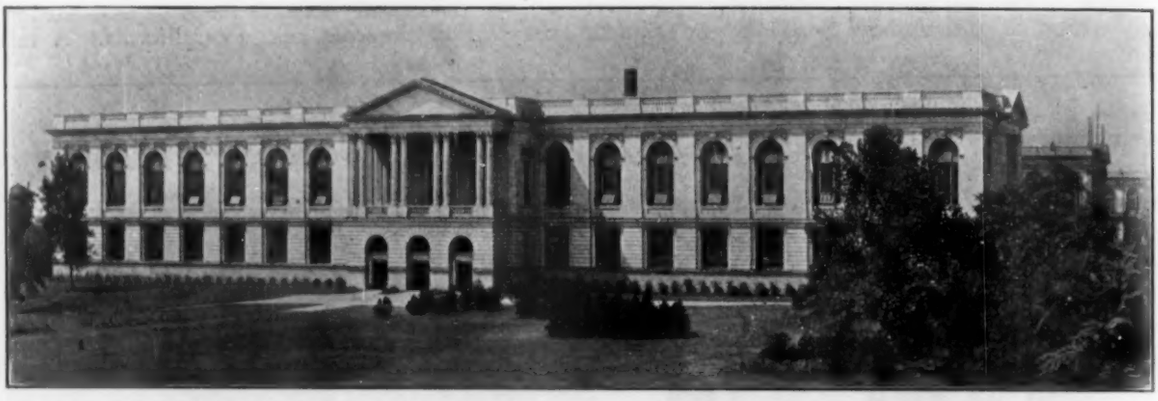
"Business men should face the facts. To talk reverently of 1913-14 prices is to speak a dead language to-day. We are on a new high price level which will be found to be a stubborn reality."

Prices went up steadily during the war, first because there was a constant and enormous increase in our circulating medium (money and credit) in which all other commodities are measured; second, because there was a constant and sustained demand for production. That demand kept all capital and labor steadily employed at a remunerative rate. To sustain that remunerative employment of capital and labor will insure continuous prosperity. The world needs production today as much as it was needed during the war. The only difference is that we need less of some things and more of others.

develop an enormous market for the commodities made for the comfort or to meet the desires of mankind. With consuming and purchasing power thus sustained our farms and factories will continue to teem with activity and prosperity will abound throughout the land. With capital and labor thus fully and profitably employed and with the enormously increased volume of our currency, the only price effect we can logically expect will be in the adjustment and probable decline of speculative prices —a result that can but little affect the level of legitimate values.

CAPITAL AND LABOR.

If we can get rid of the vicious doctrine that there must be conflict between capital and labor, we will not find any insurmountable difficulties in the path to full fledged prosperity. The idea is a false one and must be recognized as such by both sides. Each is indispensable to the other. Their interests are absolutely mutual and if they work together on this plane, both of them will benefit.



THE COMMERCIAL MUSEUM OF PHILADELPHIA, PA., WHERE THE CONVENTIONS AND EXHIBITION OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION AND INSTITUTE OF METALS DIVISION WILL BE HELD THE WEEK OF SEPTEMBER 29, 1919.

Exhibition Hall is directly back of North Hall, which is the building shown in the foreground. Visitors must pass through the main entrance to reach the Hall.

We no longer need cannon shells or powder, we need, tractors, plows, fertilizers and all kinds of machinery and supplies.

We are three years behind in our normal necessities for homes and public buildings. We are three years behind in our needs for factory and mill equipments.

We are five years behind in our needs for railway facilities, including rolling stock.

We are ten years behind in the development of one of our most essential and profitable natural resources—water power.

In this connection it may be interesting to state that, in Switzerland, Germany has acquired water power compared to which the Niagara cataract is but a plaything and by which every factory wheel of all Europe can be turned and the lighting of all the buildings of Europe can be furnished.

Fortunately, however, we are waking up to the situation and some enormous hydro-electric developments in various states are now under way.

With the capital and labor which has been devoted to war turned into avenues of production for these things which are so essential to our industrial progress and economic life, the earnings of that capital and labor will

We have shown what we can do if we all pull together. If we work with the same zeal, energy, unity of spirit and use all the productive forces of the country as effectively in supplying the ordinary wants of the people as we have worked in carrying on the war it will be possible to accomplish all that has ever been hoped for in improving social conditions. And when we say social conditions, we might as well say business conditions for that is really what it amounts to. Social conditions depend on business in its broad sense; for business is what feeds and clothes us, educates our children, pays our doctor bills, keeps our churches open, takes us to the theatres and makes life what it is.

Labor should be well paid. We have always had the highest wage scale in the world and we want it to be always the highest in the world. We have learned one very important thing, however. It is that the vital point about wages is not the rate per day or per week, but the rate per unit of production. That is the key to the industrial problem. Efficient labor is worth high wages. The man who demands high wages, without giving efficient production in return, injures himself and is unfaithful to the wage earning masses. He adds to the cost of the necessities and comforts which his fellows must buy.

As for the employer, it is to his interest that employees as a class shall be well paid. In the past there has been too much talk about a "living wage scale." Too many employers have felt that when those who depended upon them for a livelihood were given enough money in the weekly pay envelope barely to meet actual living expenses their full duty has been done. But a bare living is not enough, because a man cannot practice thrift, provide for the emergencies of the future, educate his children in a way they have a right to be educated, when he has to depend upon a mere "living wage."

If the general standard of living in America is to improve, therefore, we are not going to see any pronounced recession in wages, while in all European countries the scale is going to come up. There are going to be better working conditions everywhere, such as shorter hours, better habits, greater precautionary measures against accident and ill health, and an eight-hour day.

HIGH PRICES HERE TO STAY FOR SOME TIME

It is futile, therefore, to expect lower prices in the immediate future and the business man today who is holding off in his activities with the expectation that in the readjustment there will be a revision of prices downward is simply marking time and possibly letting his competitor get ahead of him.

We must bear in mind also that prices are only high by way of comparison. The trend always has been steadily upward and as each new level was reached prices were considered high. But in the course of time we adjusted ourselves to them. We must take the same viewpoint now. Prices, generally speaking, are not coming down, and the only stabilization really needed is that which must exist in our own minds.

Optimism and thrift must be the key note of the situation. Every circumstance today points to good times. All that is needed to start the wheels of industry whirling, to inaugurate unprecedented building activities, to furnish profitable employment to all men, to develop all our natural resources, is to realize that the time is now ripe for such conditions.

Meantime the country is growing rapidly, the natural rate of progress will demand and is demanding an expansion of producing facilities. As said before domestic business has been side-tracked for the war, now we will see the swing back of the pendulum of the clock of industry and the hour will soon strike for every worker to "go over the top."

The half billion dollar shortage in building operations in the eight North Atlantic states is a case in point. This means that there must come sooner or later a long period of pronounced activity of that part of the country. This same statement may be applied with equal force to all sections of the country.

FOREIGN TRADE—PAST, PRESENT AND FUTURE

According to figures given by the National City Bank of New York the foreign trade of this country in 1900 was $2,244,000,000; in 1910, $3,302,000,000; in 1913, $4,279,000,000; in 1916, $6,531,000,000; in 1917, $8,949,000,000 and in 1919 will approximate $9,875,000,000. Imports in the fiscal year, according to the Bank, should be about $3,100,000,000, which will be an increase of approximately 66 per cent over the year immediately preceding the opening of the world war and exports will aggregate $7,750,000,000, an increase of about 185 per cent over the same period.

Of still greater interest are the changes in the volume of America's trade with the different parts of the world. Imports from Europe show a decline of about 60 per cent. While there has been an increase in exports to Europe of almost 200 per cent. Imports from North America have increased about 150 per cent; from South America, about 150 per cent; from Asia and Oceania about 200 per cent. The total trade with South America will be nearly $1,000,000,000 in 1919 compared with $345,000,000 in 1914 and with Oceania $1,750,000,000 compared with a little more than $500,000,000 in 1914.

It is estimated by the Bank that the foreign trade of the United States in the fiscal year, 1919, will approximate $10,000,000,000. In order to reach this mark the Bank has included the trade with Hawaii and Porto

THE PRESENT

A few figures of our monthly export trade of this year compare with corresponding months of last year are interesting. In January, 1918, our exports were valued at $504,797,000, in January, 1919, they totaled $622,910,000. For February, 1918, the figure was $411,361,000, in February, 1919, $587,990,000. In March, 1918, we exported $522,900,000 worth of goods; and in March, 1919, our exports rose to $605,000,000.

But the figures themselves are not the most significant part of the story. Where did these immense totals of exports go? In part, of course, to the nations of the Entente. But what went to them was in large measure food. They have not yet sufficiently recovered from the war to begin importing the raw material for manufactures; and, of course, they are not importing large quantities of finished products.

Without delving into the actual shipments to each country, it is evident, then, that a great proportion of our exports of finished products went to neutrals, and to South American countries. And these are the peoples with whom it is most desirable we should do business, for it is better that the Entente should sell something rather than buy everything, and acquire something of the wherewithal to pay their debts, including their debts to us.

So the pessimists have not a very secure position, nor has any one who sees the future of America in other than a rosy light.

EXPORT TRADE

How are we going to continue to meet foreign competition and increase our foreign trade is a question that is susceptible to treatment from different angles. Paul Clay, a well known economist, says:

"Under the new order of things we will have to fight and fight hard for our foreign trade. It has come easy during the war, and especially during the last two years, we have loaned the other nations the capital to pay for our goods. Now, however, this lending is about to stop, and they must pay us in money or in goods, and except for small occasional items, they cannot pay in money because they have not the gold. Their difficulty is enhanced by the fact that we have become a creditor nation, whereas we used to be a debtor nation. The drop in sterling exchange then signalizes the return of such a degree of competition in export trade as has previously existed, since the war in Europe began; and this applies in particular to manufactured goods."

Franklin D. Jones, a Washington lawyer, in a recent address presents an argument in favor of the trade association which tends to show the importance of such an organization as a factor in solving the problem. He says in part:

"The great increase of productive capacity in this country has made essential a permanent substantial addition to our foreign trade. Heretofore, the products of American industry in the main did not greatly exceed domestic demands, but in many industries at present, war demands have resulted in the development of production which America cannot possibly absorb. In such a situation, an increased foreign trade is vital."

As soon as the American leaves his country's borders to engage in world trade, a new condition of things confronts him. He faces mass competition,—the fight of industrial interests of one nation against another. The industries of Germany have for a number of years been united into effective organizations called cartels, controlling production and prices. France has comptoirs, or great central selling agencies for her industries. Japan, during the war, has been forming similar export combinations, and the Board of Trade of England has for two years or more been urging the formation by the British manufacturers of the same type of organization for British foreign trade. In some industries before the war, great international combinations dividing territories and controlling prices had been formed. Competition in foreign fields is truly international and due to the absence of any effective regulation by an international body, it is apt to be hard hitting and not always honorable and fair.

Against such competition every American industry should present a united front. The trade association offers the organization through which this can be largely accomplished, provided American exporters can submerge their individualism and appreciate the importance of co-operative action in furthering the national interests of their industry.

THE FUTURE

What are the best things for the manufacturers of machinery apparatus and supplies devoted to the metal industry to concentrate upon for future foreign trade? And what are the best methods to pursue to hold and increase this trade?

Inquiries among prominent manufacturers and exporters develops the fact that there is a wide variety of opinion in regard to the matter. A large exporter, whose business runs to between ten and eleven million dollars per year and who has direct representation in South America and the far east, states that he does not look for a large increase in export business for some time. He thinks that the American manufacturer will have to give up the idea of war-time profit and be satisfied with a pre-war profit. He does not think the American manufacturer realizes yet the importance of proper representation abroad. He must not send a boy to do a man's work. The best of selling talent is not too good. We must find out what the foreign buyer wants and give it to him and not try to make him buy what he does not want and cannot sell. We must make promises of delivery and keep them. We must properly pack and also route the goods in the most economical way and last but not least, we must so arrange for credits so that the distinctly American method of cash against bills of lading in payment for goods may be changed to some system of trade acceptances.

Another exporter, who ships quite a large amount of metal goods to Europe, does not think there will be much business with England or France for some time. He thinks that as the metal mills and factories in those countries have had four years of preparation and with the enormous amount of scrap metal salvaged from the battlefields, they will be able to take care of all demands of reconstruction work. Nevertheless he is now on his way across to get what business he can.

Among the manufacturers, the feeling seems to prevail that there will be plenty of business if we go after it in the right way and in this respect they agree with the opinions of the exporter given above. A large manufacturer of platers' supplies and apparatus stated that, while he did not see much future in platers' chemicals and salts, etc., for the reason that these can be and have been imported, he did look for good business in machinery, principally automatic and labor saving. He said that "The foreigner is quick to appreciate the ingenuity of a device and to copy, so all we have to do is to keep a few jumps ahead in the design and we can sell them abroad as fast as we can turn them out."

Another point brought out was that due to the war we had been forced to hunt for materials here that we formerly imported from foreign countries. This was true in the case of Vienna lime, a material used for polishing compounds. We now have sufficient deposits here to supply our own needs and to export.

A large crucible manufacturer states that we now can send American crucibles and retorts to South America and Australia even though they are made with American clay.

THE FINANCIAL SIDE

Regarding the financial side of foreign trade, probably the best summary of the requirements is given in a paper read by Fred L. Kent, vice-president of the Bankers Trust Company of New York at the Foreign Trade Convention held recently in Chicago, Ill. He said:

"We will be called upon by our Allies to supply them with the minimum amount of goods with which they can get along, whose maximum will undoubtedly be determined more by the amount of credit which this country can furnish to them through investments and otherwise than by the demands of such countries, for they can undoubtedly use effectively more of our raw material and manufactures than they can purchase without our help. Our Allies will owe us interest, which they can only pay in foreign exchange that they can accumulate on balance, except as the United States reinvests such payments in the countries which make them.

The neutral countries of Europe should import from us more than they export to us. Our trade with South America, while against this country, should not be so in such proportion as has been true in the past. The same condition will probably prevail in our commerce with the Far East."

WHAT SOME FIRMS THINK.

It is our opinion that America can extend its export trade. There is a great opportunity in some lines, while other lines will have to be developed. We do not believe the line of Foundry Equipment and Supplies will lend itself to export over seas, as well as it will to South America.

In the past our export business has been limited. Our views today lead us to believe that this is the opportune period to develop this business, and we have spread our advertising through trade sources reaching a circulation of over two hundred thousand names, outside of North America. In the advertising world all men are talking export possibilities. We are taking our chances and place, among the advertisers with optimistic views to increase our business.

J. W. Paxson Company, Philadelphia, Pa.
By J. F. Kremer.

It is our opinion that this country is in an excellent position to extend export business. The main difficulty at present is the lack of steamer space and the difficulty in obtaining permits from abroad.

Our products are better than those supplied from other souces and accordingly we should obtain the export trade. Furthermore we are more progressive and supply apparatus and supplies exactly suited to the particular requirements of the customer, being more intelligent in this respect than other nations.

As to the best plan of increasing business abroad it would appear that local representation would be the best plan although this of course is costly. We ourselves have instituted an export department and are working up an inquiry by direct solicitation as well as by solicitation for local representation in each country in conjunction with advertising and trade papers abroad.

General Platers Supply Co., Inc., New York, N. Y.
By Edwin Oden.

PROGRESS IN ALUMINUM CASTING

A Brief Description of the McAdamite Aluminum Company's Plant at Detroit, Michigan

The new home of the McAdamite Aluminum Company, which has been in process of construction for some time past, is shown in the various illustrations. It was the purpose of the officials of this company, by virtue of their long experience, to eliminate in the new buildings all obsolete and undesirable features. The object in view was to construct and assemble the different units in the most practical and workable manner and to have all operations go right along in a continuous process; without backstepping, waste of time or effort, from the unloading of the raw material to the shipment of the finished castings.

The main foundry, as shown in the foreground of Fig. 3, is 280 feet long by 90 feet wide, and is composed of entirely fireproof construction of glass, steel, brick and concrete. The building, as seen, has reversible steel continuous sash and the latest devices for maximum of light, air and ventilation.

While the McAdamite Aluminum Company manufactures castings of the aluminum alloy known as No. 12, which consists of 92 parts of aluminum and 8 parts of copper, the product for which the special facilities of the plant are particularly devoted is what is called McAdamite aluminum alloys, and it is claimed by the company that wherever these alloys have been substituted for ordinary mixtures they have been found to be so much more desirable that a special demand has been created for them. Some physical qualities of these particular alloys are as follows:

Tensile strength.....	44,250 pounds per square inch
Compression	126,000 pounds per square inch
Transverse	87,200 pounds per square inch
Torsion	66,300 pounds per square inch

Specific gravity, 3.20.

Fusing point, 1040 degrees Fahr.

Vibration or endurance test bars ran as high as 12,000,000 revolutions before crystallization. Coefficient of expansion from 32 degrees to 212 degrees Fahr.—.002158 expansion pistons—one-half millimeter for each 450 degrees clearance. Coefficient of friction is very much like that of Parsons white bronzes—from .12 to .15, depending very much upon the character of the lubricants whether flooded or simply dropping. Stress strain representing modulus of elasticity approximately 9,000,000.

FIG. 1—INTERIOR VIEW OF THE FOUNDRY OF THE McADAMITE ALUMINUM COMPANY, DETROIT, MICH.

Electrical conductivity:

Silver at 100.....	50
Copper at 100.....	47

Shrinkage, .1678 inch per foot. Shop work shows $\frac{7}{32}$ inch per foot or 15/1000 inch per inch.

McAdamite aluminum castings are used for airplane, automobile motors, crank cases, cylinders, intake manifolds, pumps, carburetors, bodies, brackets, housings, bearings, covers and plates, etc. They are claimed to have great advantage over the ordinary commercial aluminum alloys on account of their qualities of quick radiation of heat, greater strength, density of grain and non-porosity —resisting galvanic action, non-corrosive under most conditions withstanding acids, atmospheric and other elements—but muriatic and strong alkalies are inimical and will attack any alloy containing aluminum, and where subjected to such, the castings are given a copper bath of plating which has proved very effective in preserving the metal from adverse elements. Some interesting characteristics of McAdamite aluminum compared with pure aluminum and other metals are as follows:

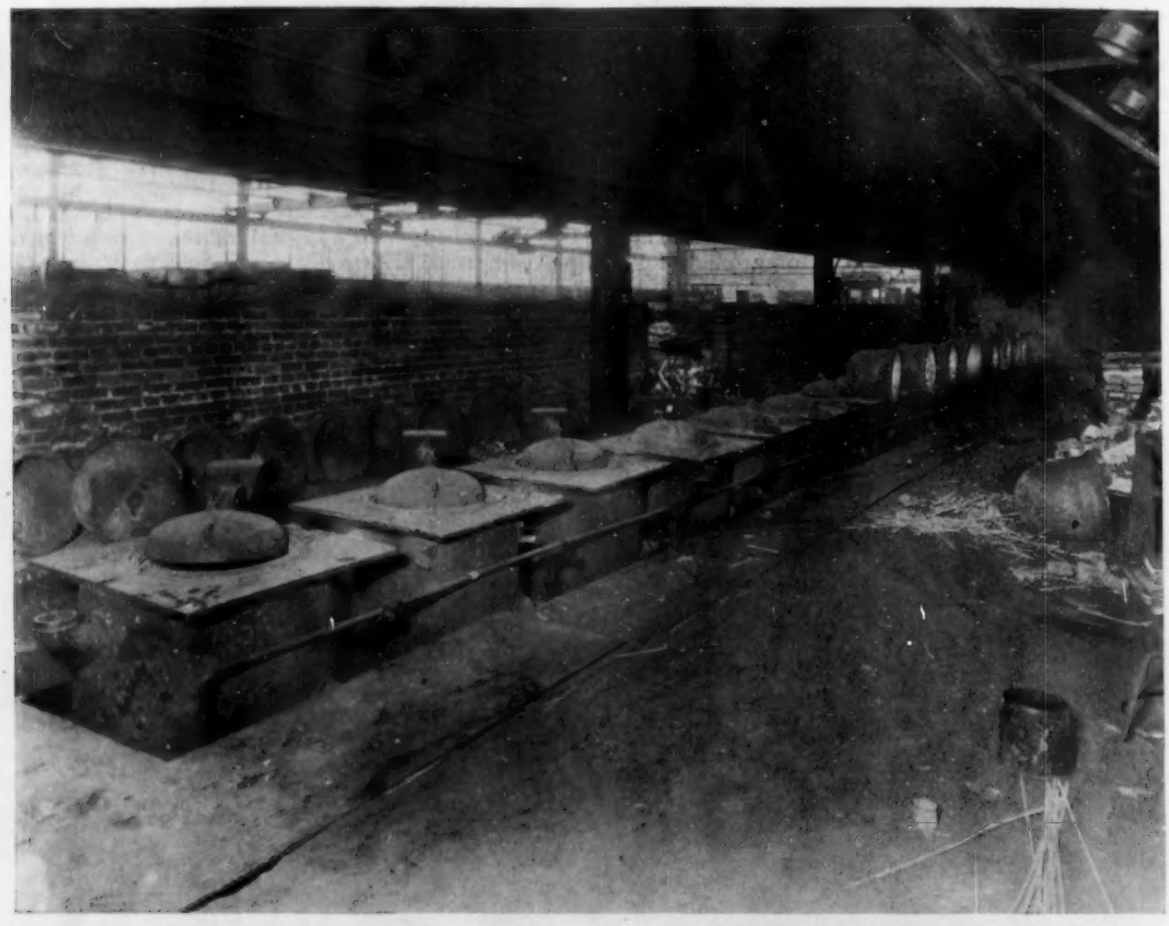


FIG. 2—A BATTERY OF MELTING FURNACES IN THE FOUNDRY OF THE McADAMITE ALUMINUM COMPANY, DETROIT, MICH.

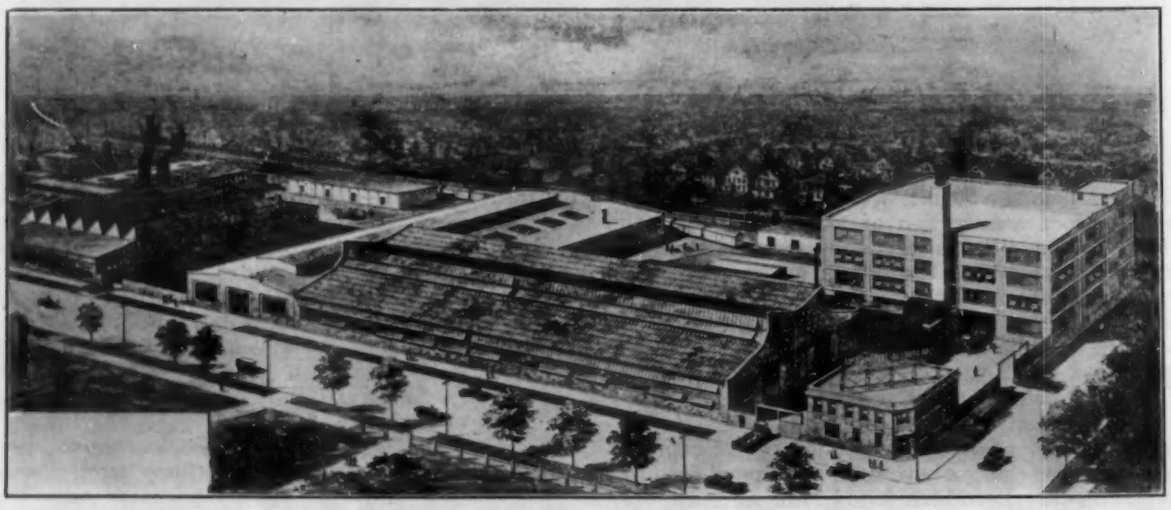


FIG. 3—BIRDSEYE VIEW OF THE PLANT OF THE McADAMITE ALUMINUM COMPANY, DETROIT, MICH. THE FOUNDRY IS SHOWN IN THE IMMEDIATE FOREGROUND.

COMPARATIVE WEIGHTS

	Cu. in.	Cu. ft.	Sp. gr.
McAdamite Aluminum ..	.125	216 lbs.	3.20
Pure Aluminum	.0963	166.5	2.67
Copper	.3195	552	8.69
Lead	.4136	709.7	11.38
Zinc	.2526	436.5	7.
Brass	.3031	523.8	
Cast Iron	.2604	450	7.2

AVERAGE SPECIFIC GRAVITY OF COMMERCIAL METALS COMPARED WITH MCADAMITE AT 3.2

Pure Aluminum	2.6	80%
Brass	8.2	256%
Bronze	8.7	272%
Zinc	7.0	218%
Copper	8.8	275%
Cast Iron	7.1	222%
Steel	7.8	243%

ment are handled by electric cranes which travel the full length of the foundry upon both bays. In this deuartment up to 500 crank cases per day can easily be moulded.

Fig. 4 gives a good view of the crankcase chipping floor in the machine building where the castings are taken from the foundry, after being shaken out of the sand, and here they are chipped and trimmed clean with pneumatic chisels and hammers.

It might be related that this prosperous business in aluminum castings has grown out of a small beginning which the company made under the management of Mr. J. P. Carritte ten years ago in Brooklyn, N. Y. The business was started originally under the name of the U. S. McAdamite Metals Company to market the alloys whose mixtures had been invented by William McAdams. The peculiar quality of the McAdams' alloys, which gave them unusual strength, tenacity and malleability, quickly carried them to the front in the metal trades and with the rapid advancement of the automobile industry it soon

FIG. 4—A VIEW OF THE CRANKCASE CHIPPING FLOOR IN THE MACHINE SHOP DEPARTMENT OF THE McADAMITE ALUMINUM COMPANY, DETROIT, MICH.

Referring to the illustrations, Fig. 2 shows a battery of melting furnaces which are capable of accommodating cruicibles holding 300 pounds of aluminum. The furnaces are operated by fuel oil and the melting capacity of the foundry is 40,000 pounds of aluminum castings per day.

Fig. 1 shows an interior view of the foundry which is mainly used for crank and transmission cases; automobile and aircraft light motor parts, together with floor moulding. The construction is such that the maximum light possible is obtained, owing to the extremely careful work and accurate inspection required. The heavy floor castings, copes, drags, boxes and moulding equip-

became necessary for the expansion of the business. Finding it to the interest of the company to make a move the business was transferred to Detroit and the present installation, as shown in our photograph, Fig. 3, is the result.

The executives of the McAdamite Aluminum Company are as follows: James Robinson, president; A. J. Gregory, vice-president; J. P. Carritte, general manager and treasurer; C. P. Reed, secretary; J. H. Williams, assistant secretary; J. P. Carritte, Jr., C. E. and metallurgist; J. Enot, superintendent, and W. Robinson, assistant superintendent.

DESIGN VALUE OF DECORATIVE MOTIFS

A Series of Articles on This Interesting Subject Has Been Prepared by the Author with the Object in View of Giving the Student Craftsman in Art Metal Work a Comprehensive Idea of the Design Value of Decorative Motifs, Their Characteristics Peculiar to the Particular Period or Style in Which They Appear and So Far as Possible to Explain Their Origin, Symbolic Significance and Decorative Value. It Is the Author's Sincere Hope That the Series Will Fulfill the Purpose for Which It Has Been Prepared—Eighth Paper.

Written for the Metal Industry by A. F. Saunders, Designer Benedict Manufacturing Company, East Syracuse, N. Y.

THE HUMAN FIGURE

The treatment of the human figure as a decorative motif in design has purposely been reserved until the end of this series of articles, because; of all the numerous forms either animate or inanimate found in nature the human figure stands supreme, and also because; it is the most difficult of any to handle in a decorative manner.

Virtues, Vices, Passions, Sciences and Arts, Ages, Seasons, Elements, Rivers, Countries and Hemispheres receive symbolic expression, and are pictorially rendered by the human figure.

The human form is also represented in art without any symbolic meaning, used solely on account of its beauty of line and form.

The purely pictorial delineation of the human figure

PLATE 15.

1—AZTEC FIGURE MOTIF, SHELL CARVING.
2—HEAD MOTIF, EGYPTIAN.
3—DECORATIVE FIGURE MOTIF, GREEK.
4—CHERUB HEAD MOTIF, FRENCH LOUIS XV. STYLE.
5—DECORATIVE FIGURE MOTIF, ITALIAN RENAISSANCE.
6—GROTESQUE HEAD, MODERN FRENCH.
7—CONVENTIONAL HEAD MOTIF, FRENCH NEW ART.

The human figure contains in its plan and principles of its structure all the most important principles of decorative construction, besides being itself the most inspiring source and chief factor and most expressive unit in design. The outline of the figure itself, built on the firm and symmetric framework of the bones expresses in its contour a series of counterbalancing curves, and we get the radiating or centering principle in the ribs, and in the set of the fingers and the toes, its whole beauty depending upon its construction.

The human form has been, and is destined to be a favorite object of representation in art, both pictorial and decorative; it is our highest type and with which liberty may less safely be taken than any other of nature's works. God created man in His own image. which falls within the domain of high art lies beyond the scope of this article. We have only to deal with its use so far as it has been received into decoration, which of course covers both a naturalistic and conventional treatment, including the full length figure, the face, the application of the upper half of the figure as a starting point of ornament, also the combining or blending of human and plant forms, and human and animal shapes forming the grotesque in which the upper half is human, for instance the Sphinx, Centaur and Mermaid. With the exception of those Eastern styles coming under the influence of the Mohammedan religion which strictly forbids the pictorial reproduction of men and animals, all periods of ornament from the very earliest beginnings of civilized art include the human figure as a motif of decoration.

While primitive ornament was principally geometric in composition, still the depiction of the human figure was attempted in a crude way, though its use was more symbolic than artistic and hardly worthy consideration from the standpoint of beauty or as an example of comprehensive decoration in design. Fig. 1, Plate 15. Thus the rendering of the human figure in a manner that may be considered decorative art in the true sense of the term as we understand it, had its beginning in the Egyptian Style. There too the figure was used symbolically but with some sense of proportion and appreciation of beauty of form. This is also true of the figure work of Assyrian and Persian art but to a lesser degree as here the conception seemed to run more to the colossal than the aesthetic.

PLATE 16

1—FIGURE MOTIF FORMING HANDLE OF SILVER CUP, ITALIAN RENAISSANCE STYLE.
2—GOLD AND ENAMEL BROOCH FIGURE MOTIF, MODERN FRENCH.
3—SILVER HANDLE FIGURE MOTIF, 16TH CENTURY.
4—SILVER JEWEL CASKET, HEAD MOTIF, ENGLISH ARTS AND CRAFTS.

In Greek art the human figure became a leading motif of decoration not as a symbol, but as the very highest form of beauty. In sculpture, plastic ornament, vase painting, and carving, the Greek decorative artist treated his figure work in the same clean cut, simple manner as he did his ornamental scroll and plant forms and always with a happy instinct, avoiding as much as possible in his art the portrayal of the horrible and the repulsive, ever seeking to put in the foreground all that was pleasant, beautiful and attractive in life. It is safe to say that in no period of ornament has the beauty of the human figure been more clearly appreciated and utilized to greater artistic advantage than in the classic art of ancient Greece. Fig 3, Plate 15, shows a figure treatment from a Greek vase painting. From antique times up to the present day, half figures have been popular as startings for ornaments, the upper half of the human body undergoing but little variation from its natural form. In fact any attempt to conventionalize the human figure usually results in a distortion; for we cannot improve upon the perfectly balanced proportions or graceful contour lines of a perfectly formed human figure. The figure when used as an ornamental feature in decoration commands the center of attraction; whatever other ornamental detail grouped about it, or forming a part of it, appears secondary and should be treated as such.

Half figures are used not only in the flat and in bas-relief, but also in round plastic art, as for brackets, supports, handles, and as purely ornamental features. Figs. 1 and 3, Plate 16.

In both the Italian and French renaissance the half figure formed a conspicuous motif of decoration, the lower part of the body terminating in scroll forms of unusual beauty. Fig. 5, Plate 15; Fig. 3, Plate 16.

The human head is often used as a decorative motif, both in a naturalistic manner and conventionalized as found in the mask and caricature, it is difficult to distinguish between the two. Literally a mask is a hollow false-face intended to conceal the human countenance, or characterize the wearer in some special way. The use of the mask dates back to the popular harvest games of ancient Greece. It was then used in the theatre. Different classes of masks were recognized—tragic, comic, etc. From theatrical, the mask passed to artistic use. It was a popular motif in the Roman and Pompeiian styles, also in altered and exaggerated forms in the various periods of the Renaissance. Caricatures differ from masks from the fact that they

represent grinning faces, deformed, distorted by accessories, or terminating in ornamental foilage. Treated in a naturalistic manner the human face has been used as a decorative motif from ancient times to the present day and in all sorts of various combinations, the full face, in profile, and the head and shoulders, the bust terminating in scroll ornaments. Winged cherubs or angel faces frequently appear in the Byzatine and Gothic styles. The winged cherub both in full figure and winged head only, was a favorite motif in the French styles of the Louis' Periods. Watteau popularized the use of the cherub and other fanciful figures in French decoration and their use was carried to the extreme during the time of Louis XV. Much of the figure work used in the decorative art of that period bordered on the vulgar rather than being beautiful. Placed in all sorts of impossible positions and combined with masses of meaningless ornament, most of the figures incited a feeling of pity rather than of admiration.

In modern decorative design as applied to art metal work the human figure represents the very highest ideals of artistic design. Its use as a decorative motif requires most careful judgment and execution. It is not a subject that can be handled in a hap-hazard manner or applied indiscriminately as a decorative feature to anything and everything we wish to embellish. The use of figures in decorative design give an added interest to the composition as a completed work of artistic value. They impart a spirit of animation, of life in its very highest form.

The next and final article of this series will be devoted to a general review of the subject of the Design Value of Decorative Motifs and their application to art metal work of the future.

EDUCATION AND THE PLATING INDUSTRY

AN ADDRESS DELIVERED AT BRIDGEPORT BRANCH, AMERICAN ELECTROPLATERS' SOCIETY, AT THE ANNUAL BANQUET HELD IN BRIDGEPORT, CONN., MAY 3, 1919.

By William Blum, Bureau of Standards, Washington, D. C.

The functions and activities of the American Electroplaters' Society as an Educational Organization, are not and should not be confined to the education of the electroplaters themselves. In order to advance the art and science of electroplating, a more general campaign of education is required, which may for convenience be considered with reference to the employer, the chemist and the electroplater.

Electroplating may well be classed as a "key industry," i. e., an industry which while not itself of great magnitude, is essential to the welfare and progress of many important manufacturing enterprises. Up until recently electroplating has been considered chiefly as a means for improving the appearance of finished products, but from now on we may expect, as a result of the lessons of the war, a far greater application of plating for protective purposes. Viewed from either standpoint, electroplating is required in the manufacture of innumerable metal articles, such as tools, builders' and saddlery hardware, plumbers' supplies, gas and electrical appliances, automobiles, silver-ware, jewelry, stoves, household utensils, mechanical devices such as phonographs, cash registers, sewing machines, adding machines, typewriters, cameras and other optical and scientific instruments.

In spite of this fact, this industry has received little attention or consideration from most employers, who simply take for granted the plater and his work, provided only that the work appears satisfactory and that the plater does not demand too much money for supplies or equipment. The possibilities of improving plating methods and equipment, of increasing production, and reducing costs, are hardly considered by the average manufacturers, even by those who are willing to spend considerable sums for research or investigation of almost any other phase of the manufacturing process. Here then is an opportunity for the platers to educate their employers to the dignity and importance of their work; and the advantage and the necessity of having proper supplies and equipment. No plater should rest content until he has succeeded in securing chemicals of reasonable purity, and rheostats and ammeters for proper control of the operations. The manufacturer should be taught the advantages of cooperation, so that he will permit and encourage the plater to attend classes and meetings of the Electroplaters' Society and its branches. In short, there is needed a better mutual respect and understanding between platers and employers.

Although electroplating is essentially an electrochemical process, and constituted indeed one of the earliest commercial applications of electrochemistry, there are today but few plating plants operated under chemical control. How much of this condition is due to the platers and how much to the chemists, it would be hard to decide, as each has given all too little consideration to the others. But it is "a condition and not a theory that confronts us." If the plating industry is to emerge from its present empirical stage, there must be a close cooperation between chemists and platers. Cooperation, because a chemist is no more able to take the place of an experienced plater than is the plater to take the place of a chemist. Both experience and science are needed.

Of the hundreds of plating plants operated in this country, there are probably at least fifty which are connected with manufacturing plants that maintain chemical laboratories, in some cases with extensive research facilities; or which frequently employ the services of a chemist, and yet it is safe to say that in not over ten of these plants is there close cooperation between the plater and the chemist. This should not be so. If the chemist is at fault he is in need of education by the plater, the first step toward which is a desire and willingness on the part of the plater for such cooperation. Since this work is usually under the direction of the plater, it is only proper that he should take the initiative.

If the plater does not at least give the chemist a chance to help him in time of trouble, it is because he is either afraid or ashamed to approach him. Afraid, that the chemist might, through a closer knowledge of plating conditions, assume control of the plating operations. Ashamed, that he might betray his limited knowledge of chemical principles. No progressive ambitious plater need have any such fear or shame. The advantage and importance of extended practical plating experiences is such that a chemist, and especially one burdened with other duties, would not seek or choose to take the responsibility for the operation of a large plating plant. On

the other hand, no plater need feel ashamed to admit his limitations in the effort to remove them; especially in view of the remarkable results frequently accomplished under present conditions. Why should a plater call upon the works electrician to adjust his "balky" dynamo, and yet hesitate to solicit help from the chemist in the control of the far more complicated plating solutions? How long would the average generator last, if the plater tried as many blind experiments upon it as he sometimes does upon a plating solution?

If then the plater will go to the chemist, whenever one is available, there is little doubt that he will be met in a spirit of cooperation. If within the next few years there are fifty plants in which platers and chemists are working harmoniously on the study of plating operations, the results will surely be of great and far-reaching value, not alone to the plants and platers concerned, but also to the great body of platers less fortunately situated in this respect.

Before discussing in detail the education of the platers themselves, it may be well to consider briefly the forms and aims of education, especially of education in science. The purpose of education is not so much to gain *information* as to acquire *knowledge*. In other words, it is not the possession of facts so much as the ability to secure and use information that determines whether a person is educated or not. Science is simply organized knowledge, as distinguished from a collection of isolated and unrelated facts. The purpose and form of such organization is to aid in the formulation of certain general statements or "laws," from which e. g., the behavior of substances may be predicted, or the cause of observed phenomena may be explained. The measure of success of any science, is its ability to predict.

The necessary steps in the progress of applied science are: (1) observation and record of facts, (2) systematic arrangement of such facts, (3) formulation of a theory to account for the observed facts, (4) test of the validity of the theory by means of suitable experiments, and (5) the application of the theory in the operation and control of industry. Some "practical men" have criticized the "theoretical men," as impractical, when as a matter of fact most "practical men" have more theories than the "theoretical men," many of which theories are erroneous, owing to failure to subject them to the test of experiment.

One of the causes of the failure of chemists to render much aid to the electroplating industry, is the lack of accurate information regarding actual facts of plating. Such information can be obtained and collected only by the platers themselves, with, wherever possible, the suggestions and cooperation of chemists. If every foreman plater, or even 100 foremen platers, were to start in to keep an accurate daily record with occasional samples, of the original composition of each solution prepared by him; of additions made to such solutions; of the amount and quality of work plated and of any unusual conditions or behavior, there would soon be obtained a mass of definite data which would render possible more rapid and more accurate scientific investigations in this field. In addition the recording of such data by platers would stimulate their desire for knowledge, and would add greatly to their interest in and enjoyment of their work.

In the planning of courses in chemistry for platers, I believe that too much stress has been laid upon the securing of information likely to be of immediate value in the practical work. This desire is but natural, especially among those who having reached or passed middle age, look for some immediate results for their efforts and sacrifice. And yet such a policy must in the long run prove short sighted, since at best it can result only in improvement of existing conditions rather than in a foundation for future work. I cannot emphasize too strongly the advantage of having such courses taught by one who is experienced in the teaching of chemistry, e. g., in some local high school or college. If to such experience, the teacher adds an interest in electroplating, fostered by frequent visits to plating plants, his instruction will almost certainly prove valuable. It is a mistake to assume that the primary purpose of such courses is to enable a plater to "analyze his solutions," valuable as such an accomplishment is. The main purpose of such a course should be to broaden the knowledge and powers of observation of the plater, so that he can operate his solutions more intelligently and so that if he cannot conduct an analysis, he can at least make use of an analysis that may be made for him. Such a course could to advantage be directed to the needs of platers, and use illustrations derived from plating; but there would be little ultimate advantage in attempting to teach methods of analysis until after at least one school year, and preferably two (of, e. g. three nights per week) of general chemistry, physics and electricity. If the plater feels (and quite naturally) that this is a long period of preparation, let him remind himself of the many years, not of nine hours but of fifty hours per week which were required for him to qualify as an experienced plater. There is no royal road to learning in chemistry any more than in any other worthwhile subject, and I feel sure that any plater willing to engage in such a course, of, e. g. three years, will be well repaid even at the end of the first year by the increased interest and enthusiasm connected with his daily tasks.

The future of electroplating rests largely with the platers of today. Unless platers, individually and collectively make use of all educational opportunities that arise, no amount of research conducted by private or public enterprise can have any permanent or far reaching effect upon the industry. On the other hand, if the platers broaden and extend their technical education, their demand for accurate scientific data will become so insistent that means to satisfy it are sure to be forthcoming.

The assured result of such education and research is to add interest and zest to the daily tasks of the factory. This goal has been well defined by Elwood Hendrick, who, in writing of "The Chemists of the Future," and their relation to industrial work, concludes in the following words, of interest alike to platers and chemists:

"There is one great quality that was enjoyed in medieval days that is lost to us. It was that which made their cathedrals so beautiful, their fabrics so rich, and their every product so enduring and strong. Men sang at their work, because they found joy in it. Now we have different customs, different conditions, different problems, but in the very measure that our men and women who constitute parts of great industrial organizations do not find pleasure in their day's work, we have degenerated. If we would be great in industry we must make our industries great by making our workers intelligent and ambitious and fine in understanding. We must make it possible for them not only to produce things, but to see that they are producing. Therefore, if our chemists and engineers, who are to direct our industries, are wise men and so illuminated that they can show a light ahead to those who work under them, we may look for the dawn of a new era of peace and good will. That will be the day—and may God speed its coming!—when ideals of service will rule in our hearts."

METALLURGICAL FURNACES.

AN ARTICLE DEALING WITH THE CONDITIONS THAT GOVERN SIZE, SHAPE AND TYPE OF METAL MELTING FURNACES. IN TWO PARTS. PART TWO.

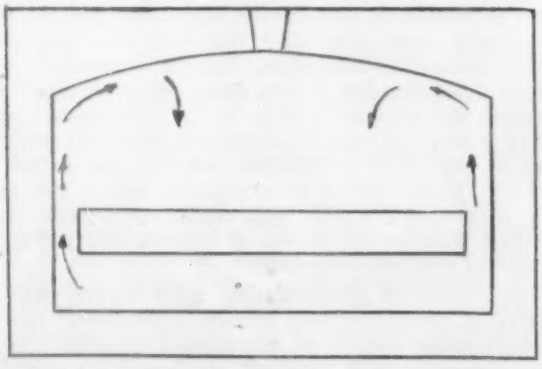
WRITTEN FOR THE METAL INDUSTRY BY ADOLPH BREGMAN, METALLURGICAL ENGINEER.

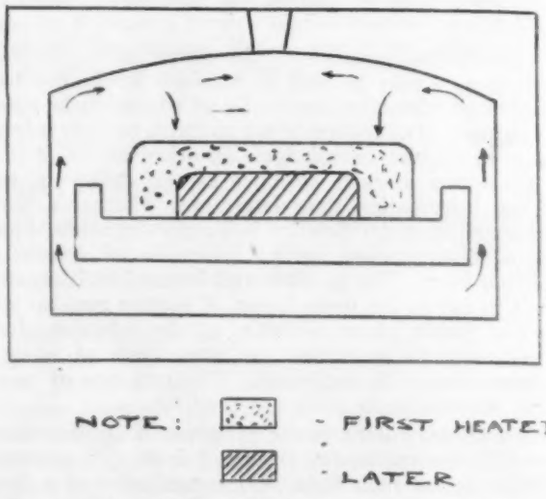
HEAT TREATING FURNACE.

The important thing in this type of furnace is uniform heating which depends on four variable quantities:

1. The mass of each object to be heated.
2. The time involved.
3. The temperature or degree of heat.
4. The exposed surface.

It should be borne in mind, first of all, that the presence of an object inside a furnace totally changes the heating arrangements within it. That is, although an empty furnace may be uniformly hot or uniformly heated in all portions, the placing of an object inside the furnace immediately sets up new heat currents and causes a variation of temperature in different parts. This may result in "broiling" instead of baking the object within it. Essentially the purpose of the heat-treating furnace is to bake the object within, *i.e.*, to heat it thoroughly and uniformly in every part. If the surface is made hotter than the inside, excessive strains are produced which cause warping or even cracking.





FIGS. 1 AND 2—ROUGH SKETCHES OF CORRECT TYPE OF UNDER-FIRED FURNACE FOR THE HEAT TREATMENT OF METAL PRODUCTS.

It is obvious that no one furnace is suitable for the heat-treatment of all objects. In general, it may be said that the best type of furnace for most uses, for the purpose of obtaining the more uniformly heated finished product, is the under-fired furnace of which Figs. 1 and 2 give a rough idea. It will be noted that in Fig. 2 there are inside ledges which are not shown in Fig. 1. The purpose of these ledges is simple. They protect the material treated from direct contact with the heat as it leaves its source. It is not necessary to have these ledges very high, because once the heat has passed the floor line, it continues in a direct line up to the roof, and is then deflected downward, to the floor. Low ledges accomplish this purpose.

Among the other points to be noted are:

1. Position of the vents.
2. The height of the door at the work opening.

The vents should be placed as near the bottom of the furnace as possible without interfering with the mechanical operation. If absolutely necessary, they may be placed in the roof, but in that case they should be so located as to force the heat to make a complete circuit of the furnace. The most common error in building furnaces of any kind, is carelessness in locating vents. Very often the heat short-circuits directly from the source out through the opening, creating a draft which not only robs the furnace of the heat which might be kept in, but actually attacks the source of supply. The vents must be closed as much as is compatible with safety in operating, so as to keep the pressure within the heat chamber at a high point.

The door height can, and always should be less than that of the heat chamber. It is always best to keep a blanket of heat at the top of the furnace over the material treated, so that when it is necessary to open the door there will be a medium for keeping the furnace in fair condition for a reasonable length of time.

The coldest spot in the furnace and the hardest to reach is always the bottom. As the heat strikes the top of the materials under treatment first, this surface is the first to feel it, and the bottom is not attacked until the heat has had a chance to work through the material. There are several methods of overcoming this difficulty which is inherent in reverberatory furnaces. One is to set the material on piers whenever possible; another is to have the heat come up through a checker-work bottom; the third, to have a combustion chamber underneath the bottom; to draw the heat underneath the chamber for its full length, and then to draw it back through the chamber over the charge for its return passage; the fourth, to mount structural steel shapes in the floor to increase conductivity. The particular solution must, of course, vary with the special case or the special problem to be solved. There must always be sufficient room above the charge and on both sides to allow a free circulation of the heat wherever possible. Circulation through the charge is very desirable. Where it is possible to arrange material to be treated in rows or lines, enough space should be left between them for a free passage of heat.

Under certain circumstances, the question as to whether the furnace should be underfired or over-fired, is extremely difficult to decide. Whenever the material can be placed in short pots or crucibles, overfiring (heating from above) is very successful. When it is placed in long crucibles or deep pots, it has almost always been found that the bottom of these containers remain cold even when the tops are over-heated.

MUFFLE FURNACES

One of the popular reasons for the use of muffles, is that they are supposed to prevent oxidation. As a matter of fact, muffles do not necessarily prevent oxidation. They do protect the charge from it to a certain degree, but if the operator is careless, oxidation and scaling will occur just as readily as if the gas came in direct contact with the material. Muffles have one great advantage in that they can be so placed as to permit the heat to circulate completely about them.

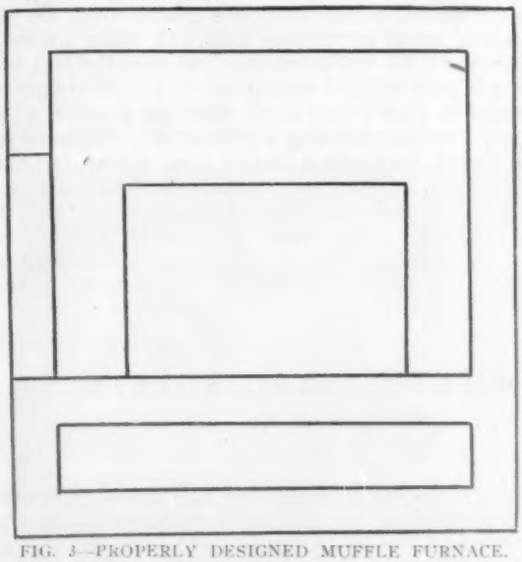


FIG. 3—PROPERLY DESIGNED MUFFLE FURNACE.
NOTE—Sufficient space above and around material for circulation of heat. Height of door is less than height of heating chamber.

A greater degree of uniformity in heating can be obtained—but this at the cost of higher fuel consumption, higher building and maintenance costs. In small furnaces where very accurate and fine work is desired, muffles can often be used to great advantage. With the increase in size, however, the expense becomes very much greater until it is prohibitive. The compromise which might be called the "Semi-muffle furnace" is the result of these conditions. This compromise is effected by having the arch, or, if possible, the door, perforated, and by forcing the heat to circle completely around the muffle before it reaches the vents. Thus an excellent distribution is obtained. It should be borne in mind, however, that whenever it is necessary to increase air space or to make perforations for the sake of more accurate heat distribution, there will very likely be a corresponding increase in the cost of operation. Fuel consumption must be reckoned with, and the cost of production must be balanced against the fineness of the product desired. It is very often necessary in an oil burning furnace to obtain a proper distribution by means of perforated arches or walls because of the peculiar nature of the oil flame which throws a hot streak along a definite line and leaves the rest of the space to be heated by conduction and radiation.

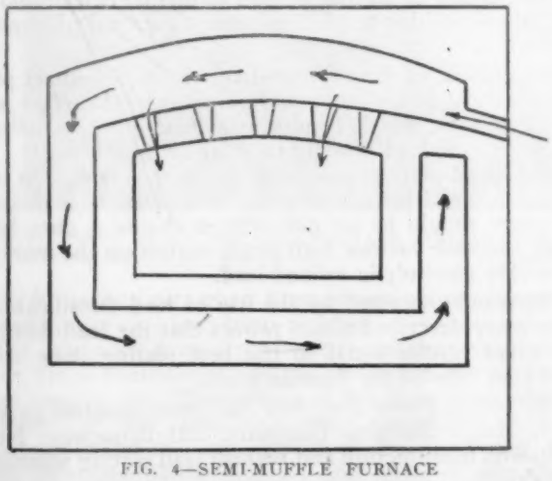


FIG. 4—SEMI-MUFFLE FURNACE

The heat from the gas burner is much softer and more easily distributed. This, however, cannot be taken as a statement that gas is always preferable to oil as a fuel. Outside of the natural gas regions, the cost of gas is too high even to consider it for use on any large scale. Also, oil burners are now being brought to such a degree of efficiency, that the character and distribution of the heat are coming more and more under control.

The flues which lead the heat from the source to the proper points should be thick enough to keep the heat from radiating through the walls. So far as the finished product is concerned, the best type of furnace is that in which the heat is admitted to the chamber from as many ports as possible. In designing a furnace it is best to put in vents of more than sufficient capacity, but this must be done with arrangements for dampering so that they can easily be controlled and later cut down, if practicable.

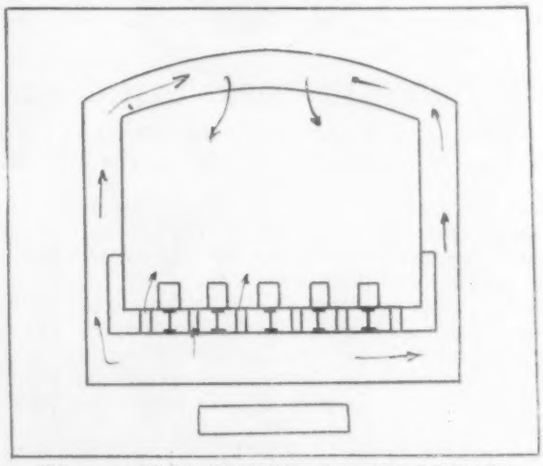


FIG. 5—A WELL DESIGNED MUFFLE FURNACE.
NOTE—(1) Inlet ports all around and under heating chamber. (2) Piers for material to allow circulation of heat underneath. (3) I-beams in floor to aid conduction of heat.

The chain grate, or moving belt type of furnace, although mechanically useful, is thermally inefficient. The continuous ingress of cold parts and cold air, and egress of the heated materials, cause a much higher fuel consumption than would otherwise be maintained. In many cases it is actually injurious to the product. However, wherever it is possible, to use this type of furnace without injuring the material under treatment, the saving in the cost of handling must be balanced against the increased cost of fuel, in order to arrive at a correct decision.

If it is found necessary to increase the size of a plant very greatly, it can be done either by adding additional small units or by increasing in size the existing one. In many plants, the custom is to have a number of smaller units rather than a few large ones. Although this does give a certain amount of flexibility in operation, it is not the best practice. Wherever possible, the units should be made as large as is consistent with mechanical handling. It is best to keep the installation down to a few units at the most.

SUMMARY

To summarize briefly, the following must be borne in mind in the designing and operation of the heat treating plant:

1. The proof of the efficiency of the furnace from the standpoint of the finished product is the uniformity with which that product is heated throughout its entire mass when the heat chamber is filled to its full working capacity.
2. With the increase of heating surface, the time of heating is diminished, and the thoroughness and uniformity of the heat are increased.
3. To heat all objects in the furnace uniformly, it is necessary to have an equal surface of each exposed for the same length of time.
4. The quality of the finished product depends not only on uniform heating, but on uniform cooling.

Perhaps the most important factor under consideration in the operation of any metallurgical plant is the human element. It is of the greatest importance that the men working at the furnace and melting pot be skilled, experienced, and reliable. It is a common mistake, and in many cases a fatal one, to economize on the type of labor employed on machinery which deals with high temperatures and delicate, and often dangerous, conditions. The best furnace properly designed, properly installed with all necessary accessories, will do worthless work if improperly handled, and this in the last analysis, is almost entirely in the hands of the man on the job. No matter how good a staff of engineers and chemists there may be in the drafting room and laboratory, they are powerless if they have to fight against operating inefficiency. Perhaps to a greater degree than any other type of engineering work, the operator has almost complete control over the plant. The skilled metal or furnace man, can make almost any furnace run. An inefficient man can ruin the best installation. It goes without saying that this type of man must be treated in such a way as to make his position a desirable one. At best, running a furnace is a very hard job—a ***man's*** work, and only a certain type of man can handle it successfully. This type is highly to be prized and well treated. It may be said without exaggeration, that there is no man who takes more pleasure in his job when he is working under proper conditions, and whose work is more interesting, even though it is arduous, than the furnace or smelter man.

LEAD PLATING USING LEAD FLUOSILICATE ELECTROLYTE

AS APPLIED ACCORDING TO THE THUM-MULLIGAN U. S. PATENT* NO. 1,283,973

WRITTEN FOR THE METAL INDUSTRY BY WM. THUM

The object of this article is to give an outline of a method of procedure for electro-depositing lead as a homogeneous, adhering coating directly on steel and iron surfaces, using lead fluosilicate bath.

The articles to be plated should be thoroughly cleaned; all rust, scales and grease to be removed by the well established methods for cleaning. Sand blasting and dry brushing work very satisfactorily where possible to apply, as will also any of the very efficient electrolytic pickling methods.

The article to be plated should be warmed to a desired temperature of 90 to 110 degrees Fahrenheit. This operation is preferably done immediately after the cleansing operation so as to avoid any possibility of oxidation or condensation of moisture on the surface to be plated.

The article is then connected with the source of the depositing current most conveniently by a flexible conductor, and immediately dipped or washed with a 1 to 2 per cent animal gelatin solution, 90 to 110 degrees Fahrenheit.

The next step, to secure the best results, should be performed immediately after the article has been given the gelatin dip or wash, is to transfer the article to the plating bath, or, if the shape of the article permits, it may be filled with electrolyte. As the article has previously been connected with the electric current, electrolytic action takes place at the moment of contact of the article and electrolyte.

In the plating operation; it was found that the use for a short space of time of abnormally high density, 25 to 50 amperes per square foot for 10 to 30 seconds, results in the deposit upon the iron or steel surface of a perfectly homogeneous covering which will build further without porosity after the current density has been lowered to normal.

Normal density of 10 to 15 amperes per square foot with a moderate circulation of the electrolyte gives satisfactory deposits.

The solutions and articles when heated to 90 to 110 degrees Fahrenheit, and maintained between these temperatures throughout the plating operations, prevent the formation of small air bubbles, ever present, when plating is done at low temperatures. The current will raise the temperature of the solution to some extent, but it has been found that best results are obtained by starting with the warm electrolyte and articles to be plated.

A lead fluosilicate solution containing 9 to 11 per cent lead and 10 to 12 per cent total fluosilicate acid (H_2SiF_6) with additions of animal gelatin of one to two grammes per gallon per day used or oftener as nature of deposit requires it.

The gelatin wash and immediate electrical contact prevent chemical action between the iron or steel surface and the electrolyte, which results in a homogeneous, adhering coating of lead directly on iron and steel.

Like in all plating processes, the best policy is to use as pure a metal for anode as is commercially obtainable, and there should be no difficulty to choose a pure lead anode from the various high grade brands on the market, preferably electrolytic refined lead.

The results obtained by the use of lead fluosilicate in the manner described above proves that the lead fluosilicate gives results equal to the best plating done with other lead salts of the fluorine acids.

The patent above described has been assigned to the U. S. Metals Refining Company, 120 Broadway, New York, who manufacture and furnish lead plating solutions to the trade.

*Described in THE METAL INDUSTRY, February, 1919.

WEIGHTS OF TIN OR LEAD ON STEEL.

For tin or lead coated iron prepare 2 inch square samples and immerse for just one minute in concentrated sulphuric acid. For 4 samples, 60 cc. will be needed and it should be heated to 250 degrees C. before use. Wash with distilled water, rubbing the surface while washing. Titrate the iron that has been dissolved and deduct its weight.

Sheets heavily coated with lead may require 120 cc. of acid and a temperature of 300 degrees C. to completely remove the coating in one minute.—J. L. J.

METAL MELTING IN ELECTRIC FURNACES

A Portion of an Address Made by E. F. Collins, of the General Electric Company, Before the Cleveland Engineering Society at Cleveland, Ohio.

REQUIREMENTS FOR ECONOMICAL BRASS MELTING FURNACE

Satisfactory and economical melting of nonferrous metals and alloys requires a furnace of the following specifications:

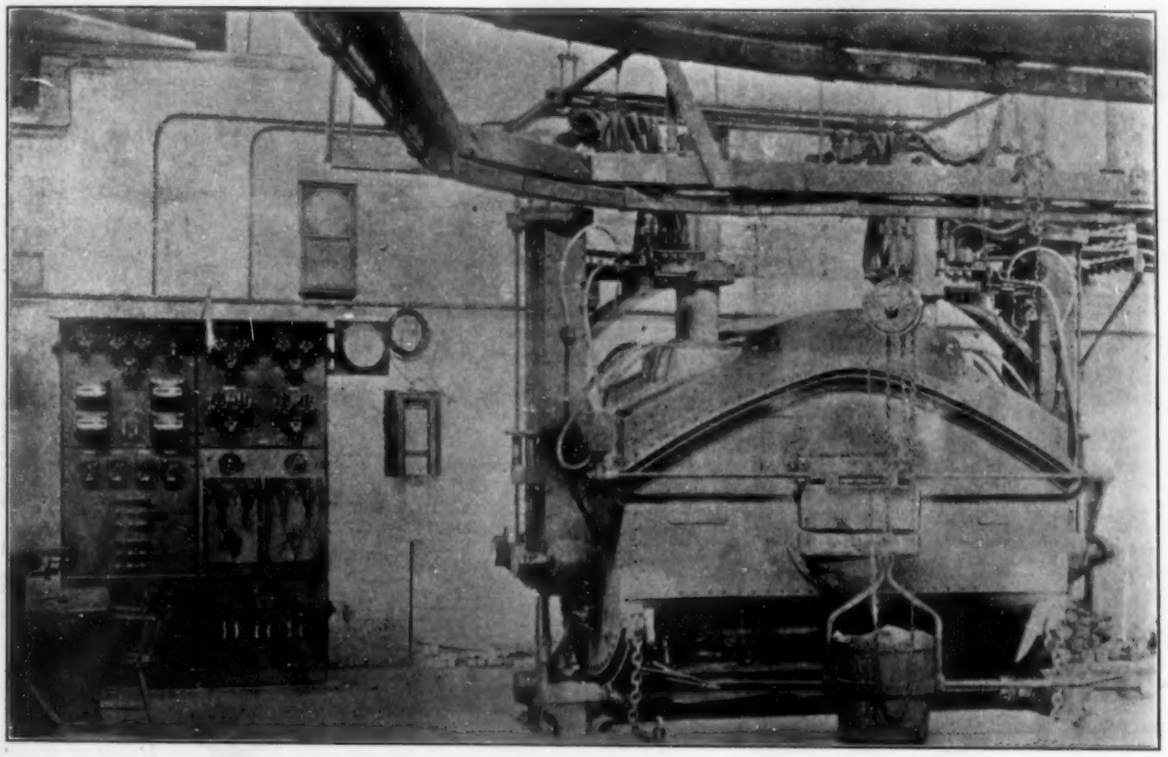
(a) Freedom from oxidation of metals or alloys while in the furnace, in fact deoxidation of metals or alloys in some degree is usually advantageous.

(b) Freedom from volatilization of metals should exist subsequent to their liquefaction and while in the molten state, to prevent loss of metal in the form of escaping vapor which usually oxidizes upon its escape from furnace to air, when furnace atmosphere is neutral or reducing—*i.e.*, free from oxygen.

(c) Freedom from slags during melting; which slags come from overheated linings, dirt from scrap, oxides from metals, etc. This allows of dry skimming (during melting) of dirt, sand and other impurities; without entrained metal in form of shot in the fused slag, that must subsequently be crushed and metal reclaimed by more or less elaborate process. Furnace should not require the maintenance of an elaborate and expensive reclaiming plant. In other words, impurities should float on top of bath in furnace, in dry powdered form and allow of skimming this from surface of bath. It should allow of the use of Sal Ammoniac or other flux to aid in cleaning metal while molten in furnace, but should not regularly require the use of such flux to give perfect metal; neither should bath require charcoal covering while melting or subsequently while held in furnace.

(d) Uniformity of alloy and absence of segregation should exist when furnace charge has reached the pouring stage—*i.e.*, test bars should show uniform physical characteristics throughout their length, and alligator surface if you please, a perfect fracture, and satisfactory crystallization and lack of segregation under microscopic examination.

(e) Furnace linings and atmosphere must be free from sulphur in the slightest degree, and furnace atmosphere controllable as regards oxygen when melting copper and many alloys rich in copper, in order to produce satisfactory foundry castings of sound metal, since copper greedily absorbs sulphur and oxide when hot, which gives rise to trouble on cooling. In fact furnace melting chambers should be free from contaminating influences, coupled with a controllable atmosphere with respect to oxygen, in which case electrolytic cathodes, free from salts of the electrolytic bath, may be melted down and be poured "at pitch" without "rabbling and poling," thus eliminating the use of the present-day reverberatory copper refining furnace and allow of making brass directly from cathode copper as well as cathode zinc. Thus saving one refining operation on copper and one melting or "pigging" operation on zinc.

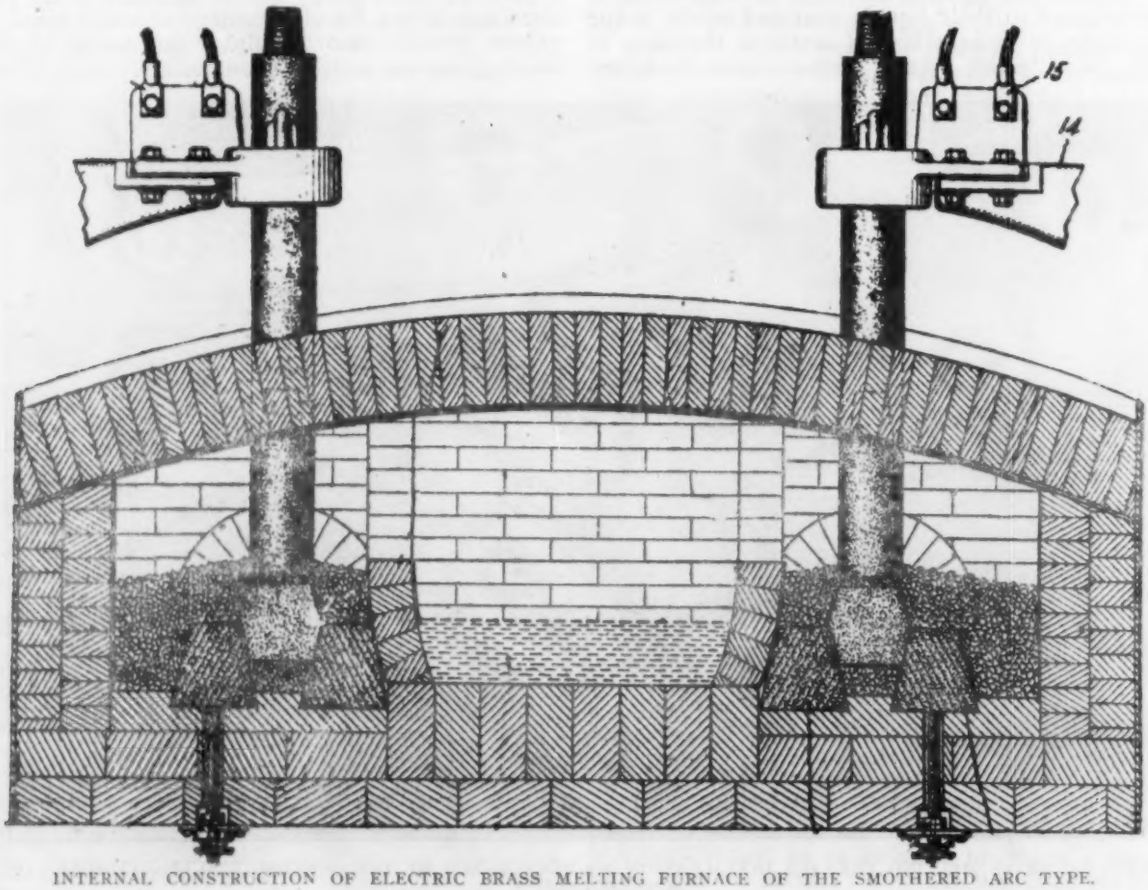


ELECTRIC BRASS MELTING FURNACE INSTALLATION MANUFACTURED BY THE GENERAL ELECTRIC COMPANY OF SCHENECTADY, N. Y.

(f) Large capacity furnaces which do not involve the use of and handling of crucibles are desirable where local conditions will permit. Large furnaces promote economy, due to higher thermal efficiency, saving floor space in proportion to metal melted, saving in labor, saving in cost of lining per ton metal melted, especially when compared to crucible cost, their storage, drying and tempering, spill from broken crucibles, etc. To be sure, where metal is melted in large furnaces, preheated hand ladles or crucibles are used to transfer metal to molds, especially where small foundry castings are being made, and it is important that these ladles or crucibles be well

and properly preheated before using, especially when pouring small parts such as ½-inch brass valves, etc., in order to get satisfactory work; but the burden of the preheated crucible is eliminated several times over by the many advantages coupled with the use of the non-crucible tilting furnace above ordinary crucible capacities. Furnace linings should in the main be built from commercial refractories of moderate cost at all times available, such as standard fire brick and shapes, with limited use of special refractories where the results justify their usage, rather than use special refractories, which can be procured only at high price and with more

"dead" or "still" atmosphere is absolutely necessary. No advantage, however, is secured in attempting to hermetically seal the furnace unless some process of distillation is attempted. Hence, if doors are made to enter furnace it is only necessary that they close in such a manner and are of such construction as to prevent an undue loss of heat and circulation of gases in furnace when they are closed. A single small opening in furnace such as required for stirring bath or pouring may produce a sort of breathing of furnace when vent is open, but loss of heat or metal is not appreciable if furnace is being properly manipulated.



INTERNAL CONSTRUCTION OF ELECTRIC BRASS MELTING FURNACE OF THE SMOTHERED ARC TYPE.

or less difficulty and uncertainty. If the foundry man or metal melter will make repairs upon his linings at least once every two weeks, and when in severe service once each week, his lining cost will be much less than when special high priced refractories are used and repairs and inspection of linings are less frequent. The refractoriness of linings should be such that it will not fuse or slag perceptibly at melting temperatures. Their inner surface should be glazed over at temperatures above the metal melting zone; this guards against slag formation during the melting process, assuming that no chemical reaction occurs between metal and hearth to reduce the fusion point of refractory. As an illustration the presence of lead in brass melting, fluxes refractories at temperatures at which they are immune in contact with the same bath free from lead.

(g) Melting chamber should be arranged so that its atmosphere may be reducing, neutral or oxidizing for certain metals and alloys, i.e., to repeat, its oxygen should be controlled. A certain flow of gas through the furnace may be required at times and at others a

(h) Shallow baths promote a more uniform and rapid melting and freedom from segregation than the deep bath. The source of heat should be a uniform mild "soaking" heat, and its temperature gradient above the bath should be moderate. That is due to a large absorbing surface, the bath takes in a large quantity of heat at a low heat potential. This transfer of heat to the metal is accomplished most successfully by radiation to the top of bath and conduction to the bottom. In case the source of heat is only slightly higher than the charge when fusing point of metal is reached the metal may be held for an indefinite period within that zone of temperature above the fusing point in which vapor tensions are not sufficiently high to cause appreciable loss of metal from volatilization. In other words, if the course of heat is such that its temperature lies in the temperature zone safely below the destructive distillation point of the metal, then the bath can in no manner exceed it. A safe way in securing this heat control is to limit the temperature of the heat source by means of pyrometer. Pyrometers are available at present, that live a satisfactory

period in certain brass furnaces, which make their use entirely practical. It follows from the above that furnace design should be such as to allow of the source of heat being held at any temperature desired, just as one may vary the heat in a carbon filament carrying electric current, as against the same power expended in a carbon electric arc, i.e., the electric filament may have its temperature fixed at any point up to about 3000° C., whereas, the carbon arc has a temperature of 3000° C. (approx.), which changes little with the size or power of the arc so long as the arc continues to burn. Likewise an efficient powdered coal flame or fuel oil flame is

CLASSIFICATION OF ELECTRIC FURNACES.

Class I.—Furnaces in which heat is developed by the passage of current through a solid, laminated or granular conducting medium or resistor.

(A) The conducting medium may consist of material that is to be treated.

(B) The heat developed in the "Resistor" is transferred to the charge by conduction or radiation or both; a wall may or may not intervene between "Resistor" and charge.

(C) A readily controllable amount of heat is generated between a fixed and movable carbon electrode,

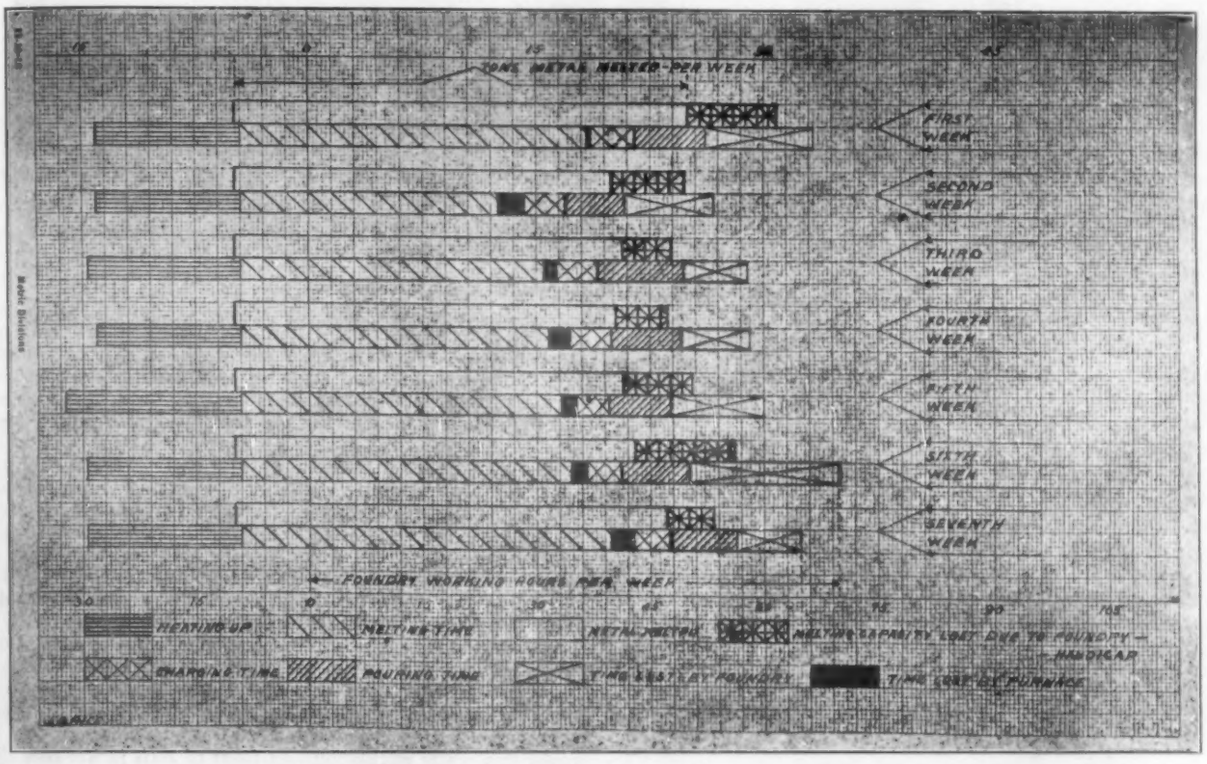


CHART SHOWING CONTINUITY OF SERVICE OF THE ELECTRIC FURNACE FOR MELTING BRASS IN A COMMERCIAL FOUNDRY.

inherently a high temperature source, unsuited to best results in melting volatile metals and brasses. This is evidenced by the fact that brass alloys cannot be held in the oil furnace without marked deterioration and loss of metal after it is ready to pour.

(i) Dependability and continuity of operation.

(j) Heat distribution should be fixed and, if possible, automatically controlled, i.e., heat received by radiation as related to that received by conduction should be such as to secure uniform heat of bath. If any variation in the ratio of heat radiated to top of bath and that conducted to bottom is permissible, this variation should allow of reduction of radiant heat at top of bath at once as the fusing temperature is reached for subsequently, due to the fact that when bath is liquid its bottom convected heat will give uniformity of temperature to the bath.

ELECTRIC BRASS MELTING FURNACE.

The foregoing sets forth more or less in detail the requirements for economy in melting blass alloys. It is now desired to consider the characteristics of the electric furnace and see how completely the electric furnace overcomes the obstacles met within the Fuel Fired Furnaces for melting Non-Ferrous Metals and their alloys.

their distance apart being maintained such that the granular carbon lying between the faces, gives rise to many chains of series and multiple contact or resistance arcs, enveloping adjacent electrode faces.

Class II.—Furnaces in which heat is developed by the flow of current through a liquid or solid conductor.

A—Electrolytic.

B—Non-Electrolytic.

Class III.—Furnaces in which heat is developed by flow of current through gas or air.

(A) Arc furnaces in which arcs play between two or more electrodes, near material to be heated or between one or more carbon electrodes and charge to be heated.

In the making of brass, furnaces lying in each of the three classes have been tried out. Furnaces lying in Class I and II lend themselves readily to the generation and control of a mild "Soaking" heat such as is required for melting volatile alloys. As illustration the common resistance furnace lies in Class I, and the induction furnace in Class II. Furnaces in Class III generate too intense and burning a heat to be used with even questionable success in melting volatile alloys without the use of much unnecessary manipulation and watchfulness requiring much skill. Control of the electric arcs in atmospheres high or low in volatile gases, freedom from

surging, and low power factor and high metal loss, are some of the serious problems confronting the man who would melt volatile alloys in the Class III arc furnace. Their employment had best be left for steel.

To enumerate briefly some characteristics of the furnace shown in Fig. 1, which makes it essentially suited to melting non-ferrous metals and their alloys, we have the following: (1) Temperature of heat generating source controllable at will. (2) Heat generated is of the mild "Soaking" type uniformly distributed, and any workable temperature gradient may be maintained between charge and heat source.

(3) Heat received by charge, from above on sides and through bottom.

(4) Bath is comparatively shallow and large surface exposed to receive heat (bath depth approximately 6 in. in 1,500 lb. furnace).

(5) Furnace has normally a reducing atmosphere, which may readily be made neutral or oxidizing.

(6) Automatic control of power, requiring little attendance.

(7) Furnace atmosphere free from contaminating gases.

(8) "Dead Atmosphere" practically restrained from escape exists normally in furnace.

(9) Temperature controllable, so that slags do not form in melting brass. Hence simplicity of metal recovery from dirt skimmed from top of bath in furnace.

(10) Furnace may be "forced," i.e., heat may be fed to metal as fast as it is absorbed and high rate of melting results with all its advantages and none of the disadvantages met with in fuel fire furnaces.

(11) Dependability of furnace and continuity of operation under commercial conditions are illustrated in Fig. 2.

The delays here due to furnace are of short duration when compared to the time the furnace was delayed due to foundry conditions; in other words, little melting capacity was here lost and chargeable to the furnace as compared to that lost due to delays for which foundry alone was to blame.

A NOTABLE ALUMINUM CASTING

The casting shown in the cut marks an advance in the art of metal fabricating that is worthy of more than passing attention. One cannot get a good idea of the difficulties attendant upon the production of a casting of this character from a mere picture. We do not know of any better way to acquaint our readers with the magnitude of the job than to let the man who completed it tell

ALUMINUM ROTARY MOTOR CASTING MADE AT THE PLANT OF THE ALUMINUM CASTING CO., FAIRFIELD, CONN.

the story. The casting is made of aluminum and was cast at the Fairfield, Conn., plant of the Aluminum Castings Company under the personal supervision of Superintendent James F. Dieter. He tells how it was done in a recent issue of *Lynite News* as follows:

This casting was made by molders Ralph Guice, William Guice, F. Buchanan and Adolph Engles; coremaker Stanley Ryzack, Edward Harrington, Tony Slocik and Lewis Piash under the supervision of foundry foreman Joseph Carroll and core room foreman Aleck McPhee.

When we received this pattern the patternmakers had left 6 loose pieces for the circle on side to be drawn back leaving green sand ribs, and had made no provision for the supporting of the cylinder and jacket cores in drag, and also expecting the foundry to cope out the top half filled with ribs in green sand.

Our Mr. Murphy, foreman of the pattern shop, was called upon for some quick work, and he certainly came through, changing the side loose pieces for the ribs from green sand to dry sand, making 9 cores to complete the circle. He also made a large flat circle core for the ribs for both drag and cope, and we made a large core plate that would just take in this round core. We also added to the print of the pattern on the drag half enough print to take care of the round core plate. We turned out the drag core on this plate, which, having some center marks on it, made it easy for a perfect set in the mold. We assembled on this drag core the entire job which consisted of 18 cylinder cores, 36 jacket cores in halves. The jacket cores had to be pasted around the cylinder cores so no fins would stop water circulation. In front of each jacket core there was an intake and outlet core made with a dividing wall so that each one of these cores made a separate manifold with a small water jacket around each. There were 18 copper pipes which extended from one side of the cylinder to the other for the oiling system.

After we had assembled the job we made a perfect close and were rewarded with a fine casting weighing, when ready for shipment, 585 pounds.

After we had produced a good casting, Mr. Tipps told us that he had had the patterns in Belgium, and that he had never been able to get a good casting. So I think that his remarks were quite complimentary to this plant.

The casting was for the Tipps Motor Company at Woonsocket, R. I., for their rotary motor. There were 26 ribs on the end of this casting, and 15 on the side, the ribs being 1½" high and 3/16" thick. The casting was 48" in diameter and 17⅜" high.

PICKLING STEEL FOR PLATING.

We presume the product is made from hot rolled steel, the oxide or scale is always heavier on the hot rolled stock. We would suggest that a hot pickle prepared containing 1 part of muriatic acid and 1 part of water be utilized. A pickle composed of 1 part of commercial hydrofluoric acid and 3 parts of water heated to 160 degrees also gives excellent results. Either of these combinations should readily remove the scale, but they must be used hot.

Hydrofluoric acid cannot be used in a stone jar so we advise using a wood tank lined with lead.—C. H. P.

NOTES ON ALLOYS USED IN BRITISH BRASS-ROLLING MILLS

EFFECTS OF IMPURITIES, CASTING DIFFICULTIES, HINTS ON ANNEALING AND COMPOSITION OF SOME OF THE ALLOYS USED.

BY A. J. FRANKLIN.

Great care should be exercised in the selection of the metals used for the manufacture of alloys intended for use in brass-rolling mills, and all materials should be approved by the laboratory and staff before use. It is no use attempting to run a modern brass-rolling mill without the aid of a competent, and consequently, well-paid chemist or metallurgist, who must be on the spot. A consultant to whom samples are occasionally sent is of little use. In mixing brass for casting, scrap copper, scrap brass from miscellaneous sources, and spelter of doubtful origin are often used, and for some kinds of castings this is not detrimental, but, when the metal is to be rolled into sheet, or drawn into tubes or wire, the use of such ingredients is fatal, entailing a large percentage of failures and corresponding scrap.

EFFECTS OF IMPURITIES.

The metals employed for making up alloys for brass-rolling must be of good quality, and the impurities present as low as possible.

Antimony and bismuth are particularly noxious, and even when present only as traces, tend to produce cracking, either during the "breaking-down" or during the subsequent annealing. Even should the metal, by means of easy and careful rolling, succeed in passing successfully through the mill, there is always a danger of "season-cracking" developing after subsequent spinning and stamping operations, and, as this trouble occurs at the customers' works, it is a source of particular annoyance to all parties, generally resulting in the rejection of the whole batch of metal, good and bad alike. Antimony present should not exseed 0.006 per cent., and bismuth should be less than 0.005 per cent. A word of warning might here be given as to the use of "fired" S.A.A. cartridge cases as scrap in the manufacture of rolled brass. Such cases are most unsuited, being contaminated with mercury and antimony salts, which are constituents of the percussion mixture. Numerous schemes have been tried for their removal by treatment with suitable chemicals, etc., but without any real success, antimony being always present in the casting after melting, making it unsuitable for brass manufacture.

Arsenic.—The effect of arsenic varies considerably, and depends on the extent and nature of other impurities present and on the composition of the brass. In combination with antimony it is particularly troublesome, but by itself it is not so detrimental as it was once thought to be. It has recently been fully investigated by Smalley, who concludes that arsenic embrittles all zinc-copper alloys when present as free arsenic, but that the alpha-brasses, that is those containing 70 per cent. copper and upwards, are not affected to so great an extent. Experimenting with 70/30 cartridge brass, containing only traces of other impurities, he found that the presence of small quantities of arsenic (up to 0.09 per cent.) gave consistently better results than brass free from arsenic. The author's experience confirms this, but the quantity must not be exceeded, and other impurities must not be present to any extent, more especially antimony, lead, and bismuth. Arsenic is detrimental, even when present only in traces, to the physical properties of hot-worked brass (56 per cent. to 62.5 per cent. copper), even although it may not affect the hot-working properties. The fracture becomes coarsely crystalline, and the ductility and resistance to impact is greatly reduced.

Lead is usually present (picked up as an impurity in the spelter) up to 0.5 per cent., and this amount must not be exceeded if the alloy is intended for subsequent drawing into wire or for heavy stamping work, as above this maximum both the tenacity and ductility of the metal fall away rapidly. With best brass (70/30) the lead should not exceed 0.25 per cent. To metal intended for machining, however, lead is often added up to 2 per cent., when it gives short, crisp turnings, and appears to act as a kind of lubricant, considerably reducing the cost of machinery. Such alloys, however, require extra care in the rolling mill, and especially in the annealing, since they must be handled with the greatest care when hot.

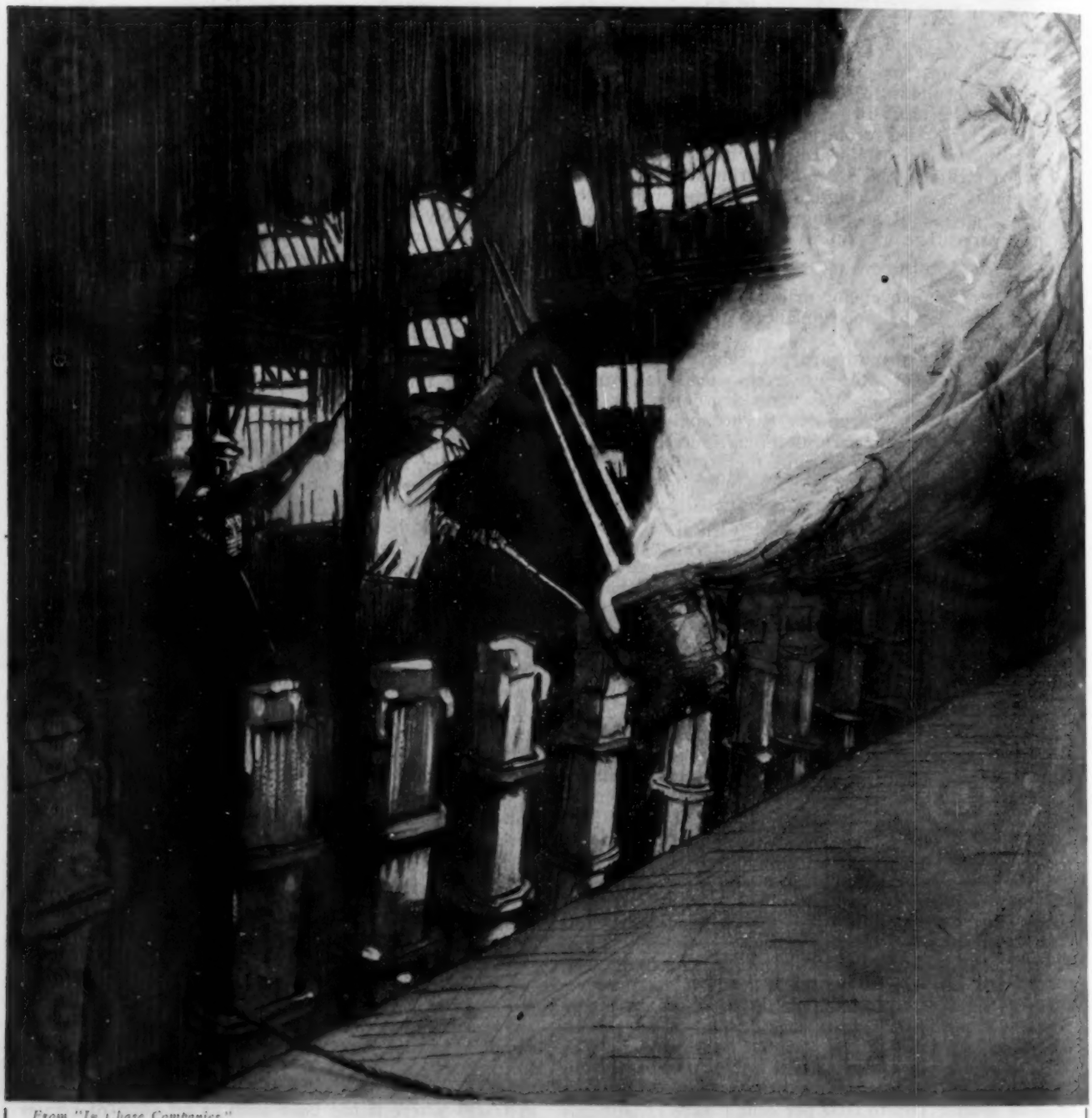
Tin is frequently present in brass-rolling mill alloys, and the Government are large users of Naval Brass (62 per cent. copper, 37 per cent. zinc, 1 per cent. tin), and Admiralty Brass (70 per cent. copper, 29 per cent. zinc, 1 per cent. tin). Tin increases the tensile strength, yield point, and hardness of brass, but decreases its ductility. It has been found that up to 1 to 1.5 per cent. tin considerably increases the resistance of brass to corrosion by sea-water, and consequently, these alloys are of great practical importanee. Above 2 per cent. tin is detrimental to brass.

Iron should be avoided in brass intended for sheet and strip rolling, and for wire or tube drawing, since it materially increases the hardness, and seriously impairs the color of the finished metal, making it red instead of the characteristic yellow color. Every care should be taken in the melting of the alloy, for it is here that the iron is picked up, either due to care less selection of the ingredients, or, more likely, to the introduction of too much "poker" into the molten metal by the caster. Experience proves that wrought iron pokers and skimmers are the best to use, and that if protected by a coat of black-wash very little iron is taken up by the molten metal. Wrought iron is preferable to steel. In the case of special non-magnetic brass and alloys of high melting point, such as cupro-nickel, etc., plumbago stirrers are used, and the danger of contamination with iron is thereby removed. The presence of iron increases the amount of "piping," and renders casting difficult. It tends to segregate in the form of hard nodules, which are exceedingly troublesome in rolling, and even worse in drawing.

Aluminum raises the strength of brass considerably, but rapidly diminishes the ductility. It is not usually found in brass alloys used for sheets, wire, and tubes, but is a frequent constituent, up to 1.5 to 2 per cent. of complex brasses intended to give strong castings and forgings.

Manganese is often found in brass-rolling mill alloys in traces where it has been used as an alloy of copper and manganese for purposes of deoxidation of the metal prior to pouring. Cupro-manganese is the best and safest deoxidizer for brass intended for rolling, since, unlike phosphorus and other deoxidizers, any slight excess remaining in the alloy is not detrimental. Manganese increases the strength of brass considerably without impairing the ductility, up to the amounts usually found (2 per cent.). It is therefore a very useful metal to add

to brass. Alloys containing 2 per cent., with copper contents 57 to 60 per cent. (beta-brasses), are much used as pump-rods, bolts, rivets, etc., as they resist corrosion well both of sea water and acid liquors. They make excellent sand-castings for such purposes as high-pressure steam valves, ship's propellers, rudders, etc., but those of high manganese content are not employed for sheet rolling or wire and tube drawing.



From "In Chase Companies."

THE CASTER.

An Artist's Adaptation from an Actual Photograph Taken in the Casting Shop of Chase Metal Works at Waterville, Conn.

CASTING TROUBLES.

Cuprous Oxide and Sulphurous Gases.—It is very important that all copper used in making alloys for rolling should be "tough pitch," that is, should not contain any excess of cuprous oxide, because if cuprous oxide is present in the copper to any extent, the latter is reduced by the spelter when added, and a highly infusible oxide of zinc is formed, which is only removed from the molten metal with the greatest difficulty and waste. Generally it is not properly removed, and dirty, defective castings are the result. The same trouble happens when the copper is allowed to oxidize on melting down, or the metal allowed to stand an undue length of time in the furnace awaiting the preparation of the molds or for other causes. The best preventative is the liberal use of good stick charcoal, broken about the size of walnuts, which should

always be added to the crucible before charging any metal, and again from time to time, so as to keep a layer covering the top of the molten metal. Such a precaution also counteracts the harmful effects of the sulphurous gases of the furnace, which are so readily absorbed by copper and its alloys, and which cause sponginess and porosity in the metal. If present in any quantity sulphur will render brass quite brittle, especially when other impurities, harmless in themselves, are present. A strict watch should be kept on the sulphur contents of the coke used, and every care taken to prevent pieces from falling into the crucible and floating on top of the molten metal. No economy is effected by the use of "cheap" coke when making alloys for the brass-rolling mill; "gas" coke is not recommended, but a good, hard, silvery coke, such as is obtained from the Durham coalfields, should be employed. The calorific power should run at least 12,500 B.T. Units, with an ash content of less than 10 per cent., and sulphur not exceeding 1 to 1½ per cent.

With the use of such coke the melting can be made in the minimum of time, the work of the casting gang is lessened, the metal can be poured at the proper temperature, and risks of absorption of furnace gases are reduced to a minimum. The amount of cuprous oxide present in the "tough-pitch" copper used should on no account exceed 1 per cent., and if 0.5 per cent., so much the better. "Under-poled" or low-pitch copper contains as much as 3.5 per cent. cuprous oxide; such a copper breaks "short," and is a brick-red color rather than the characteristic salmon pink. It sets with a marked depression on the surface of the ingot, which is readily recognized, and an unfailing indication of excess of oxygen.

"Soaked" and "Burned" Metal.—It seems such a simple matter to melt brass that the casual observer wonders where one can possibly go wrong. "You simply place the metal in the fire, and wait until it is molten." The practical man, however, knows very different from this; he knows that slow melting produces badly oxidized brass containing dross ("soaked" metal), and that too rapid melting not only burns any metal which comes in contact with the flame, but causes gas absorption with the formation of blow-holes ("burned" metal).

A Hint to Furnace Designers and Experimenters.—Some furnace designers have completely overlooked this latter fact, and are placing on the market furnaces which really melt too quickly, a powerful gas or oil flame of high velocity being used, in which the metal is generally pre-heated to close on its melting point. It is scarcely to be wondered that such practice fails to turn out metal in equal quality to the old-fashioned and much-abused coke-fired furnace of the pit type, and that metal melters have taken out whole batteries of such furnaces, and substituted them with coke furnaces of the latest design. Great improvements have been made during the last few years in the coke furnace, more especially with regard to the reduction of radiation losses; and as was pointed out at the discussion on Metal Melting, held at the March meeting of the Institute of Metals, 1917, it is very unfair to compare the oldest types of coke furnace with the latest design in either gas or oil-firing. This is very marked in Brook's paper on the "Use of Coal Gas as a Fuel for Melting of Non-ferrous Alloys" (Journal Institute of Metals, 1917, vol. 17, where he compares the working of a coke-fired furnace of old design, and melting only 30-lb. charges, with a gas-fired furnace of latest design and in new condition. Gas-firing gives the best results on small size furnaces, which are notoriously inefficient when worked on coke. It is a pity that such unpractical figures as published in this and other papers pass into literature of the subject, because they are misleading, and, as pointed out by Smout and other speakers during the discussion, they cannot be taken as representing works' practice, and are certainly of no use as a guide to the brass-rolling mill foundry manager Yet most elaborate data as to labor charges, life of linings, life of crucibles, etc., are given, all based on the melting of 50 cwt. of metal over a period of 10 days! The comments of an intelligent melter, working on a battery of gas-fired furnaces, into whose hands this paper was placed, would have interested the Council of the Institute of Metals, and the author in particular.

Casting Temperature.—In order to obtain proper castings, it is absolutely essential that the metal should be poured at the correct temperature. If too hot a porous casting results, and, if too cold, the metal will be dirty and non-coherent, in either case rendering the metal quite unsuited for rolling. It is impossible to give exact figures for casting temperatures, as, of course, much depends on local conditions, the type and size of casting being poured, etc. For 60/40 brass the best temperature for commencing to cast is about 980 deg. C., for 70/03 it runs about 1,030 deg. C., and for the best gilding alloys, containing 90 per cent. copper, 1,090 deg. C. A recent research by Prof. Carpenter (Journal Inst. of Metals, 1918, vol. 18) shows how vitally important the question of temperature is in the production of sound castings. It is essential that any foundry engaged in the casting of alloys for brass-rolling should go into this question, and determine for itself the most suitable temperatures at which to pour the various mixtures employed. It is the author's opinion that in these days of piece-work and hustle, more work is spoiled by casting at too low a temperature than at too high, unless it be in gas and oil-fired furnaces, where local over-heating often takes place.

Blowholes and "Spilly" Castings.—The two most serious troubles in the casting of alloys for the brass-rolling mill are blowholes and spilly metal. As has already been shown, when metals are melted in ordinary crucible furnaces, no matter whether fired by coke, oil, or gas, air and the furnace gases are absorbed to a greater or lesser extent, by the molten metal. (The only furnace in which this does not take place is the electric furnace, which for non-ferrous work has not come into use to any great extent in this country, chiefly owing to the high price of electricity.) The hotter the metal the greater the amount of gas absorbed, hence the essential fact of avoiding overheating, quite apart from all considerations of fuel economy, crucible life, metal losses, etc. As the metal cools these gases are liberated, consequently if the cast is poured at too high a temperature, and while still full of absorbed gas, blowholes and "spilly" metal results. The use of excessive or unsuitable dressing on the ingot molds used to contain the casting is also a source of unsound metal. Some dressing is absolutely necessary to prevent the metal biting into the iron, but it needs to be applied with care and discretion and not dashed on in unlimited fashion, as one sometimes sees done.

A vigorous stirring with a cool iron poker just prior to pouring, combined with the other precautionary measures already mentioned, is the best preventive of blowholes.

"Spilly" metal, as has been indicated, is generally the result of cold or oxidized metal, and is caused by the introduction of dross into the casting, thereby rendering it dirty and non-coherent. Great care must always be taken to see that the metal is properly skimmed before pouring, and that all particles of dross and slag are removed from the spout of the crucible. The addition of a little salt prior to stirring is of great assistance in causing the entangled dross to rise, and in skimming it off the

molten metal. The skill of the caster is a great factor in avoiding "spilly" metal, since much depends on the pouring of a clean, steady, and continuous stream at just the correct rate, more especially at the commencement of the operation. Another common cause of spilly castings is the use of dirty molds. Mold cleaning is a tedious and trying job, and the caster's helper, on whom this work falls, will shirk it if at all possible.

ANNEALING.

The annealing of zinc-copper alloys requires considerable care, and great improvements have been effected in this direction during the past 10 years, although much still remains to be done, more especially with regard to educating the workmen. It is a great fallacy to imagine that annealing is an unskilled job, and is a question of "beef" rather than brains. It is impossible to take a man from the street corner, and put him to anneal brass after one week's experience of factory life, and if tried, there is trouble ahead. Annealing, if properly carried out, is a very important operation, and requires much intimate and practical knowledge of the work in hand. A highly-skilled intelligent annealer is worth a great deal in any brass-rolling mill, and, unfortunately, they are few and far between. The temperature employed for annealing is of the greatest importance, for if too low, the metal is not properly annealed, and the strains are not released, whereas if the temperature is too high the metal is over-annealed, or may be "burned," and consequently ruined. With alloys of low copper percentage (61 per cent.) there is a tendency for the metal to "run" if locally overheated, which is much accelerated when lead and tin are present. Temperature is the all-important factor in annealing brass; it is necessary to raise the whole charge to the correct temperature, and retain it there for a period, until the annealing is complete, and the ductility of the metal restored. For brass containing 70 per cent. copper the correct annealing temperature is 650°C., and for the 60/40 alloy 600°C.; for heavy work these temperatures may be raised to 700°C. and 640°C. respectively, but beyond these limits the metal rapidly alters in structure, and there is grave danger of over-annealing. As a rule, there is greater danger for this to take place in impure metals, owing to the impurities forming a fusible alloy around the crystals.

With regard to annealing, the following axioms can be laid down:

(1) Annealing is never instantaneous; its effects are at first rapid, but become slower as the operation is nearing completion.

(2) The temperature at which annealing commences depends upon the metal or alloy, and also on the amount of grain distortion caused by previous mechanical treatment.

(3) Above the correct temperature for annealing crystalization is very rapid, and the tensile strength and ductility of the metal is seriously reduced. Such metal is said to be over-annealed, or if the overheating has been very serious, "burned."

(4) The presence of impurities materially increases this danger for burning to take place and affects the temperature of annealing.

In some brass-rolling mills it is the practice to quench the metal as it leaves the annealing furnace in the belief that it remains softer than if allowed to cool gradually. With many alloys this is the case, but such practice is not to be recommended on account of the risk of developing "water-cracks." Another trouble, occasionally met with in annealing, is known as "fire-cracks," where the metal suddenly splits on placing it in the furnace. This trouble, which usually breaks out as a kind of epidemic, is generally traced to unequal stresses in the metal, often due to its being insufficiently worked at some stage in the rolling, generally in the "breaking down." The trouble is particularly prevalent in 70/30 metal, and in larger castings, when, possibly, the pinches have been eased to reduce the strain on the machinery.

COMPOSITION OF ALLOYS USED.

The beta-brasses, that is, alloys containing 57 to 62½ per cent. copper, are used for making rods, tubes, and various shaped sections by the extrusion process, and are much used for hot rolling. Alloys under 61 per cent. copper are not usually worked cold. The cheapest variety of brass used for sheet rolling contains 61 per cent. copper, but the most ductible alloy is that containing 72 per cent. copper. There is no object in using an alloy with a higher copper content than this, unless the rich color of the gilding metals is required. A few popular varieties of brass used in the sheet-rolling mill are given hereunder:

Best gilding, 90 per cent. copper, 10 per cent. zinc.

Pale gilding, 80 per cent. copper, 20 per cent. zinc.

Prince's metal, 75 per cent. copper, 25 per cent. zinc.

Cartridge metal, 72 per cent. copper, 28 per cent zinc.

Admiralty brass, 70 per cent. copper, 29 per cent. zinc, 1 per cent. tin.

Best brass, 70 per cent. copper, 30 per cent. zinc.

Standard brass, 66 per cent. copper, 34 per cent zinc.

Screw quality brass, 64 per cent. copper, 36 per cent. zinc.

Clock brass (machining), 64 per cent. copper, 34 per cent. zinc, 2 per cent. lead.

Naval brass, 62 per cent. copper, 37 per cent. zinc, 1 per cent. tin.

Common sheet brass, 61 per cent. copper, 39 per cent. zinc.

Nickel silver (formerly known as German silver) contains from 50 to 70 per cent. copper, 10 to 20 per cent. nickel, and from 5 to 30 per cent. zinc, the mixture being dependent upon the use for which it is intended.

Monel metal for rolling contains 66 per cent. nickel, 30 per cent. copper, 3½ per cent. iron, and the balance impurities, such as manganese and silicon.

MIXTURE FOR "BRAZING" METAL.

A satisfactory mixture for castings that are to be brazed with hard solder is copper 80 and zinc 20. This alloy is known in many brass foundries as "brazing" metal. The hard solder in most general use is composed of copper 50 and zinc 50, so that the difference in melting point between the two alloys is sufficient to enable satisfactory brazing results to be obtained. In fact hard soldering can be done on alloys much below the 80 copper and 20 zinc alloy, in melting point. The increase in melting point due to the addition of 2 per cent nickel is not very great; and it is more than counterbalanced by the fact that all alloys containing nickel are hard to braze because of the coating of nickel oxide on them. The nickel also makes the metal sluggish when molten, so that it has to be overheated for pouring, thus rendering shrinkage cracks likely and increasing the difficulty of obtaining solid castings.

Hydraulic metal (copper 100, tin 10, sheet or tube yellow brass 25) cast into ingots and remelted, gives very good results in castings that must stand hydraulic pressure. A skilled mechanic would have no difficulty in brazing copper tubes into tube heads made from this mixture, using ordinary brazing solder. Silver solder seems to be the most satisfactory alloy for brazing nickel alloys. Silver solder, however, is very expensive, and should be avoided as much as possible.—J. L. J.

EDITORIAL

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THE METAL INDUSTRY

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THE BUSINESS OUTLOOK

Better business, a better market, is today the subject before the industrial world. As a means of doing our share towards bettering conditions THE METAL INDUSTRY herewith issues a business number, in which we review current commercial and export conditions and put before our industry the best opinions available on what can be done to further business interests.

The issue of this number comes at a time when we distribute our DIRECTORY AND BUYERS' GUIDE, which this year has a total output of 15,000 copies, circulated among the metal shops all over the world and which will be the means of putting before consumers what is made in the United States.

As is told in the article on RECONSTRUCTION DAYS, which begins in this issue of THE METAL INDUSTRY, the one vital question that most interests business men today is the question of prices. What caused the prices to go up, particularly of articles not needed for war? Why should prices now be higher than they were just at the close of the war and why has there not been the recession so confidently expected when the war should be over? What is the outlook for the future and how can business stand continued high prices?

An excellent analysis of the situation is given in an address made before the recent Editorial Conference in New York by O. P. Austin, statistician of the National City Bank of New York. He says:

"Surely there must have been some general underlying causes for the world advance in prices, this simultaneous demand by people of all classes and in all parts of the globe for higher prices for their products irrespective of their relation to war requirements. While we may be willing to accept the immediate demands of the war as a partial explanation of the advance in the prices of foodstuffs and certain manufacturing material and manufactures, we must look farther for the cause of the similar advance in articles upon which the demands of the war could have had no direct bearing. It is true that a marked advance in the price of one important class of products does cause an advance in the prices demanded for other articles which must be exchanged for those in which the advance has already occurred, but it does not seem probable that the advance due to scarcity of a comparatively few of the world products required for war could have been the chief cause of the doubling of prices in practicall every article produced in every part of the world, many of which had not the most remote relation to war requirements.

PRINCIPAL CAUSES OF ADVANCE IN PRICES.

Apparently the principal causes of the advance in prices during the war were, stated in their chronological order: First, "scarcity demand;" second, the advance in wages presumably due to the increased cost of living and demand for labor, and, third, the large increase in world circulating media, or to put it in a single word, "inflation." Prof. A. C. Miller, member of the Federal Reserve Board, an authority whose views are entitled to high consideration, in a recent address before the American Academy of Political and Social Science named as the two chief causes of the advance in prices, "scarcity demand" and "inflation," adding that "there is so much evidence of an artificial abundance of money in comparison with the things that are purchasable by it that the abundance of money must be credited *with at least* an

equal influence in explaining the high prices which have prevailed."

Edgar Crammond, the distinguished British statistician and economist, in an address before the London Institute of Bankers on March 26, 1919, stated that the three facts which would tend to make the fall in prices a very gradual one are: (1) The vast increase in the amount of paper money; (2) the huge increase in the amounts of public debts of the belligerents; (3) the determination of labor to maintain wages and improve the standard of living.

* * * "If the governments which have been the chief participants in the world increase of currency should fail to reduce materially that excessive supply, and if the world's demand for food, manufacturing material and manufactures is to continue at the present rate, are we justified in expecting a general reduction in prices in the near future? The question I think answers itself. There will be, of course, instances in which there will be material reductions, but in general terms the outlook for marked or rapid decline, at least in the near future, does not seem encouraging."

ELECTRIC FURNACE PROGRESS

THE METAL INDUSTRY has endeavored to record the developments in the art of melting metals as they occur. Back in 1910 we published a serial article descriptive of the various styles and types of furnaces then in use in both the United States and England. While the electric furnace was not among those described we alluded to such a furnace and made some predictions as to its future. Then in May, 1911, we published a description of an electric furnace which we believed was the first furnace of this kind that gave promise of being a commercial success for melting copper and brass alloys. This was known as the Herring "pinch" effect furnace, and it was well received by the metallurgical world. In June, 1912, we published a description of an electric melting furnace which was called the Johnson furnace and was to be used for the smelting and refining of zinc, and we believe it is still being used for this purpose. We heard nothing more of the Herring furnace until October, 1913, when G. A. Clamer read a paper about it before the Chicago convention of the American Institute of Metals. The paper was published in THE METAL INDUSTRY for February, 1914. Mr. Clamer thereupon reported very satisfactory progress of the furnace, and we believe that the furnace was taken up and tried out by the Scovill Manufacturing Company of Waterbury, Conn. The Herring furnace has now disappeared from the market and has been replaced by the Ajax-Wyatt furnace, which was described by G. A. Clamer in a paper read at the convention of the American Institute of Metals held at Boston, Mass., in October, 1917. This furnace is of the induction type and has quite a wide range of usefulness. It has one feature that rather unfits it for anything but continuous running on one or two mixtures. This is the fact that the furnace is started by pouring into it a charge of molten metal and then melting down the rest of the charge. In case of wishing to change a mixture or to shut down, the furnace must be entirely emptied and recharged when starting again.

The years 1916 and 1917 saw quite a development in the electric furnace and a resumé of types in use and descriptions of them was given in a paper presented at the convention of the American Institute of Metals at Boston, October, 1917, by Dwight Miller, a portion of which was published in THE METAL INDUSTRY in February, 1918. One of the most promising of these furnaces was the Baily furnace which is of the resistance type and was fully described in the September, 1917, issue of THE METAL INDUSTRY.

The year 1918 was productive of an electric furnace of the resistance type which had been in process of development for some time. This furnace is known as the "Rocking Electric Furnace" and is the design of H. W. Gillett of the Bureau of Mines at Ithaca, New York. The first public announcement of this furnace was made in an advance bulletin of the Bureau of Mines (THE METAL INDUSTRY, June and August, 1918) and was finally fully described in United States Bureau of Mines Bulletin 73 by H. W. Gillett and A. E. Rhoads.

We now come to the current year and we publish in this issue of THE METAL INDUSTRY a portion of an address before the Cleveland Engineering Society in Cleveland, Ohio, by E. F. Collins on electric furnaces in general, and on the furnace developed by the General Electric Company in particular. The portion of Mr. Collins' address which we publish here gives a fair idea of the furnace which is known as the "smothered arc" type.

WHAT WILL THE ELECTRIC FURNACE DO?

There are several important considerations to be taken into account if one is contemplating the installation of an electric melting furnace. The first is usually a stumbling-block with a large number of concerns. This is cost of installation. This is high and for this reason one should consider the question well before sinking a large sum of money. The type of furnace best suited to the requirements should be carefully considered and then the particular advantages claimed by the makers for that furnace should be thoroughly investigated. Very often a furnace is purchased which is not at all suited to the existing conditions and disaster and losses ensue, whereas a careful consideration of the problem would have led to the adoption of the proper type. There are now on the market, we believe, sufficient furnaces that have proven their merits for certain phases of work to enable one to choose the best for his requirements.

Among the important points to be considered as to the one best form of furnace are the following:

COST OF OPERATION

With labor and crucibles at their present high cost the electric furnace offers an attractive proposition to the large metal melter. At the present price of crucibles it would be found that the cost of these and labor for melting will be about equal. Then, too, with the electric furnace there is no reclaiming plant necessary, but neither is there where gas or oil is used for fuel.

One large electric furnace manufacturer gives out cost of operation figures by which he claims to melt metal for $8.50 per ton as against a cost of $13.50 per ton for the open flame oil furnace and $19.50 per ton for coke pit fired crucible furnace. He shows a zinc melting loss of 5 per cent. for oil and 3 per cent. for coke, with a corresponding cost, with zinc at 10 cents per pound, of $10.00 per ton for oil and $6.00 per ton for coke. These figures are undoubtedly too high, as careful melting in both cases can cut them down materially.

He also figures 1,200 pounds of coke used at $9.00 per ton for melting a ton of ordinary brass. This is also too high, for any good melter will be able to maintain an average of between 500 and 600 pounds of coke consumption per ton of brass melted. Again he assumes that crucibles will give fifteen heats, whereas our crucible manufacturers would hang their heads in shame if their crucibles did not now run close to thirty heats. He puts the cost of electrical energy at 1½ cents per kilowatt hour, whereas it costs 2 and 2½ cents in a good many places.

We are not criticising these figures with a view of ridicule, but merely to show how important it is to investigate thoroughly, into every phase of the subject before investing one's money.

Another most important point to consider is: How to get the melted metal into the molds. The photograph accompanying Mr. Collins' articles in this issue shows a ladle in front of the furnace. This is the usual practice, and where the metal is melted merely to get it into marketable shape as for ingots or possibly in some instances for sand castings, it probably proves satisfactory. The ladle must be kept heated, and sometimes it may be necessary, if the melting unit is a large one, to turn on the current and reheat the charge before it is all poured. There is certainly a drop in temperature from furnace to mold and care must be exercised to have all the metal in the furnace at the proper pouring temperature. In the case of melting metal for wrought purposes as in a rolling mill this is a serious question and is now being solved by some of the big mills in their own way.

The American Brass Company makes use, we believe, of the Ajax-Wyatt furnace or similar type in small units and picks the furnace up on a crane and carries it to the molds, thus making it its own crucible. Another mill we know of is now planning an electric melting installation and will bring the molds to the furnace and make use of an incline in order to allow for the dip of the pouring spout as the furnace is inclined. Still another mill figures on using a turntable on which the molds are placed and then will use a tiltable ladle fixed at the mouth of the furnace and use a tap hole as in a reverberatory furnace, thus saving time and metal.

A final point to be considered in choosing a furnace is: How can the mixture be stirred so as to ensure that the last of the heat will be the same composition as the first? This is particularly important where mixtures are made according to specification and a slight variation up or down is vital. The furnaces that admit of tilting or rocking on their axes seem to come the nearest to meeting the situation.

We have no doubt but that all of these questions are being solved and in the near future we shall find that where large amounts of metal are handled the old dirty and inefficient coal and coke fired pit furnace with its wash-house nuisance will be a thing of the past. We can repeat what we said in an editorial last October now with more emphasis, "The electric furnace has arrived."

CORRESPONDENCE AND DISCUSSION

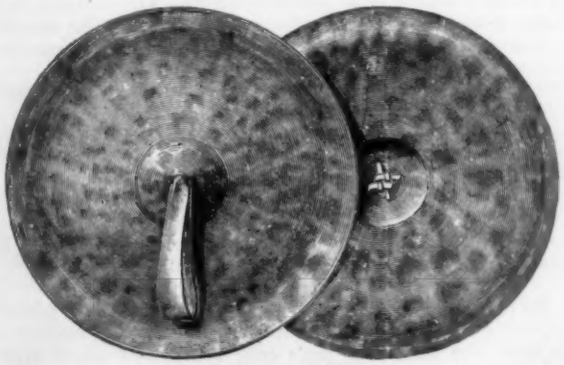
While we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein.

THE CASTING OF CYMBALS

To the Editor of THE METAL INDUSTRY:

Referring to the correspondence that we have had in relation to the casting of cymbals in this country we have found, as we said in our first letter, which was published in THE METAL INDUSTRY for April, 1919, conditions have changed.

We decided that it would not be right for us to send out any samples of our work for the reason that we have made a five-year contract with Rudolph Wurlitzer Company of Cincinnati, Ohio, for our entire output and they are our sole distributers, both for America and all of Europe. This concern is in a position to take care of all inquiries regarding Turkish cymbals.



CAST BRASS CYMBALS.

My only comment on this subject at this time is this: I am an Armenian and am acquainted with the secret of making cast cymbals. I have started a factory here in Buffalo, and I am going to turn out cymbals on a large scale. We will guarantee our cymbals to be the most sonorous and possessing a high musical pitch, surpassing even the well-known Constantinople make. As we have remarked before, there is no fear that this art will be lost, and we will absolutely guarantee all of our cymbals and stamp them "Kapriel Kazanjiian & Company, Wurlitzer, sole factor."

K. KAZANJHAN & COMPANY.

Buffalo, N. Y., April 16, 1919.

NEW BOOKS

Metallic Alloys—Their Structure and Constitution. Third edition. G. H. Gulliver. 5½ x 7½ inches; 410 pages including index; 310 illustrations. Bound in boards. Price $3.75. For sale by The Metal Industry.

This is a reprint of the third edition of a work on the structure and constitution of the most used alloys of copper, tin, lead and zinc and its value to the metal industry is demonstrated by the exhaustion of the edition and subsequent demand for a reprint.

The work is not intended so much as a guide to the practical manufacture of alloys as it is to furnish a knowledge of the equilibrium conditions and unstable conditions of mixtures and as being of assistance in regulating their composition and heat treatment. This book should appeal to engineers and metallurgists who desire some knowledge of the minute structure of metals and alloys.

Punches and Dies—By Frank A. Stanley. Size 6 x 9 inches. 434 pages, 618 illustrations. Bound in cloth. Price $4.00. For sale by The Metal Industry.

Die makers, tool makers and draftsmen have long been looking for a practical book with definite accurate and up-to-date information on punches and dies. This book, which has just been issued, is calculated to exactly meet their needs. This is claimed to be the first complete manual on the best modern practice of punch and die work. The material is presented clearly and concisely for practical use and is illustrated by an abundance of excellent photographs of actual tools and operations. More than 200 sectional drawings and diagrams showing exactly the lay-out and construction of punches and dies are included. The book illustrates the methods used in such representative firms as The Marchant Calculating Machine Company, E. W. Bliss Company, Smith Premier Typewriter Company, Noiseless Typewriter Company, Westinghouse Electric and Manufacturing Company, Waltham Machine Works, B. C. Ames Company, Henry Disston Sons Company, Aluminum Products Company, American Coin Register Company, Holt Manufacturing Company and the Gilro Machine Company.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS: JESSE L. JONES, Metallurgical PETER W. BLAIR, Mechanical CHARLES H. PROCTOR, Plating-Chemical

ALLOYING

Q.—Will you give me a formula for a bearing metal that is similar to Lumen Bronze but tougher? We have to make bearings that are very thin and if we use Lumen Bronze, a few sharp blows will shatter them. Any of the copper bronzes would answer the purpose but they are too expensive to use as regards, dies, etc. An alloy with a melting point of about 950 degrees Fahr. that would bend before breaking would answer the purpose. Tin is so expensive that we have to keep the percentage down.

A.—Lumen Bronze, according to the United States patent No. 632443 consists of zinc 100, copper 5 to 20 and aluminum 2 to 10. It has usually been found to contain, as put on the market, zinc 85, copper 10 and aluminum 5.

Sampson metal is a similar alloy, somewhat softer and tougher. It contains 88 zinc, 4 copper and 8 aluminum. It is very much doubted whether any of these zinc base metals would be tough enough to suit your work.

It has been customary for firms whose requirements demanded a very thin lining of genuine babbitt, to roll the babbitt into a thin sheet, cut out pieces of suitable area, press them into tinned bronze backs and heat to such a degree that the babbitt lining will be soldered into place.

It is suggested that heavy, rolled sheet zinc, might be cheap enough and strong enough for your bearings. If they could be pressed from this material and given a thin lining of babbitt, possibly you would secure a satisfactory article for your purpose.—J. L. J. Problem 2,694.

CASTING

Q.—One of our brass foundries has experienced considerable difficulty in making small bronze castings for a manufacturer of acetylene welding apparatus. The castings, which are very small, must be free from lead as they have to be welded; also they are subjected to 100 pounds pressure and must not be porous.

A straight mixture of 88 copper, 10 tin and 2 zinc has been used, melted in a small tilting furnace, similar to the Monarch. The castings are porous although phosphor tin and several kinds of fluxes have been used. A brazing metal mixture of 85 copper and 15 zinc has been recommended, but it was thought that this would be more porous than the 88-10-2 mixture.

A.—Brass parts of the character described are usually made from the so-called "pressed" brass. This is practically a drop forging process and gives dense strong fittings that are satisfactory even on hydrogen cylinders under pressure up to 800 pounds.

As the pressure you have to guarantee is only 100 pounds to the square inch, you should be able to succeed by using the well known hydraulic bronze formula. Melt together 100 pounds of copper, 10 pounds of tin and 25 pounds of heavy sheet yellow brass and pour into ingots. Remelt and pour into the castings at a moderate temperature. Pouring at too high a temperature is liable to give a coarse grained casting that will leak under extremely high pressures. Pouring too cold may cause the metal in the mold to set before the air and occluded gases have a chance to escape and the castings may fail because of blow-holes.

If the castings in question are of a simple form, it may be possible to cast them in iron or graphite molds and thus secure a metal that will be dense and fine grained.—J. L. J. Problem 2,695.

CLEANING

Q.—Occasionally we find it necessary to re-japan dress fasteners which are imperfectly japanned, and in so doing we experience considerable trouble for the reason that we are unable to perfectly strip and clean the imperfect japan from the fasteners. The part of japan that remains on the fastener and which we are unable to remove, combines with the new coat and causes the japan to clog the springs and holes. Can you give us a process by which the japan can be removed so as to leave the fastener perfectly clean so that the new coat can be applied without encountering the above trouble?

A.—The only satisfactory and at the same time cheap method we can suggest for removing the defective coating of japan from the brass snap fasteners would be to prepare a strong hot solution of caustic soda and water and tumble the fasteners in the solution until the japan is all removed. It would be advisable to use an iron vertical tumbling barrel.

The solution could be prepared as follows:

Water	1 gallon
Caustic soda 76%	6 to 12 ounces

Possibly the minimum amount would give the best results.—C. H. P. Problem 2,696.

DRILLING

Q.—What is good to use on a drill when drilling very hard high carbon steel?

A.—When drilling very hard, high carbon steel, the drills by reason of the friction heat up and it is necessary to use something to keep them cool. A liquid that is used with success in drilling armor plate, was found to consist of gasoline disguised by means of a red dye and a few drops of oil of cloves. It should be noted that such compounds are very dangerous indoors.—J. L. J. Problem 2,697.

FLUXING

Q.—We want to apply a coating of pure lead on steel stampings but do not seem to have the proper flux as the lead will not adhere to the stampings. What flux would you suggest using?

A.—It is possible that a double solution of bichloride of mercury and chloride of ammonia will give you the desired results. We would suggest that you try the following:

Water	1 gallon
Sal ammoniac	2 to 4 pounds
Bichloride of mercury	½ to 1 pound

The mercury should be dissolved in a small proportion of boiling water before mixing with the sal ammoniac. The proportions given are only basic proportions and some experimenting may be necessary.—C. H. P. Problem 2,698.

MIXING

Q.—I shall be glad if you will let me know the composition of English coinage bronze?

A.—The composition of coinage bronze is as follows: Copper 95, tins 4, zinc 1. Bronze medals are often made of copper, and electro-bronzed afterwards for color.—W. T. F. Problem 2,699.

Q.—As there is great competition in the manufacture of plumbing goods I would like to know some good and cheap mixture of yellow brass for bibbs and basin cock bodies and small stems. The mixture that I am using for the trimmings is 80 copper, 20 zinc and 4 lead; for the bodies, 84 copper, 14 zinc and 4 of lead.

We buy a lot of nickel plated tubing and I use 50 pounds of this to a heat, in a No. 60 crucible, adding 2 pounds of lead. Do you think it wise to add this amount of lead? Do you think the nickel in this metal will cause dirty, spongy castings or will it burn out before the metal is heated to the pouring temperature.

A.—The competition in plumbing goods to which you refer has resulted in the production of so many cheap mixtures devoid of tin that hard, strong castings with seats that will wear and not wire draw are seldom found. Similar remarks can be justly made in regard to steam goods. The maker who seeks a reputation for using in castings of this character only the well known 88-10-2 mixture, with perhaps ½ per cent. of lead to facilitate machining, ought not to have to look for much competition.

One manufacturer has produced quite satisfactory castings entirely from light yellow brass scrap, melted in the electric furnace, his mixture coming out copper 76, lead 3, tin 3 and zinc 18.

An alloy of copper 75, tin 1.75, lead 6.75, zinc 16.50 has been used for some classes of work. In a mixture as high in lead as this, the small amount of nickel which would be added by the use of the nickel plated tubing you mention would be beneficial rather than otherwise. It would prevent segregation of the lead, and with careful melting, there should be no danger of dirty, spongy castings. Any large amounts of nickel would make the alloy sluggish, quick-setting and hence the castings would be difficult to feed and liable to be spongy.—J. L. J. Problem 2,700.

Q.—We have been supplying a manganese copper for a number of years to foundrymen for the manufacture of manganese bronze. We have found recently that a great many have changed this practice and are now using a ground 80 per cent. ferro-manganese with what are claimed to be very good results. We note in one of your previously published articles that you state that it is necessary to alloy the 80 per cent. ferro-manganese with iron separately. We know for a fact that this is not the practice now carried out. We would like to have any information that you may have or to which you can refer us.

A.—In the making of manganese bronze it has been customary to form an intermediate alloy of manganese and copper, manganese and tin or manganese and zinc, etc. Iron may be and usually is included in this alloy.

The reason for using an intermediate alloy is that the manganese or ferro-manganese used has a rather high melting point and this is also true of the iron. If direct addition of the manganese and iron is attempted, an imperfectly mixed manganese bronze usually results. If this is cast into ingots and remelted, greater uniformity is secured but there is a rather high loss of zinc in the remelting operation. For this reason many brass founders prefer to use a low melting point intermediate alloy as a means of making the various additions and they then pour the manganese bronze directly into castings without any remelting. In this way the loss of zinc from volatilization is very much reduced.

Ferro-manganese in the ground or powdered form may be added directly to the molten copper, provided the temperature of the copper is very high and the ferro-manganese is added a little at a time. The loss is high, however, reaching 15 to 20 per cent. as the ferro-manganese burns after the manner of a flashlight powder. By mixing with the ground ferro-manganese a flux of soda ash, lime, etc., the melting loss is somewhat reduced and a cleaner alloy is obtained.—J. L. J. Problem 2,701.

MOULDING

Q.—I would like to ask for any available information as to the preparation of metal molds for casting of bronze die castings. What should be used on the molds to get the best results?

A.—Good results can be obtained from cast iron molds. The practice that has been followed in the making of glass molds, should be used. In other words, the castings themselves should be chill cast and a good grade of charcoal iron running about 2.50 per cent. of silicon, should be used. This will give dies that are close grained, but still may be machined without difficulty.

It is not customary to coat the molds, although a wash of lime or bone-ash may be used. Graphite mixed with shellac is advocated as a protection to the mold and a means of preventing the castings from sticking, but it should be used sparingly for the shellac will produce more or less gas and unless provision is made for its free escape, blowholes in the castings may result.

Kinite, a chromium steel, which is said to be heat resisting and not to scale, has been recommended for molds as have nickel, Monel metal, Nichrome, etc. Cast iron, however, has the great advantage of cheapness and it gives reasonably good results.

Aluminum-iron bronze is the alloy that is most commonly used for casting into metal molds and the interesting suggestion has been made that it is possible to use the same alloy both for the molds and the castings. The idea is that the molds would soon have a thin film of aluminum oxide that would allow the bronze to be poured into the mold without injury to the mold.—J. L. J. Problem 2,702.

PLATING

Q.—What size generator would it be necessary to use to operate the following:

100 gallon rotary nickel plater
250 gallon still nickel solution
100 gallon acid copper solution
100 gallon cyanide copper solution.

Also necessary voltage required to operate rotary plater.

A.—For the capacity that you have outlined you will need a generator having a variable voltage of 5 to 10 with a capacity of 500 amperes. This generator is operated on a three wire circuit and will furnish 10 volts and 250 amperes to the rotary plater and a 5 volt current and 500 amperes to the other solutions.

If you are able to use a sufficiently conductable solution in your nickel rotary plater you might get by with a 5 volt current, but for most of these platers 5 volts is too low so it will be necessary for you to use the 10 volt machine.—C. H. P. Problem 2,703.

Q.—Would like to have your advice on concrete plating tanks for nickel? Are they better than wood, will they last longer and cause the least trouble. We are figuring on two such tanks about 14 by 3 by 3 feet, also one for an acid copper solution and one for a brass solution. What is the best cement to use; also gravel and sand? Are lead lined tanks better than those lined with pitch?

A.—Concrete tanks are being used quite extensively at present, but they should be made up of reinforced concrete with iron strands to prevent cracking. Portland cement, a sharp sand and gravel may be used and the best proportions to use could possibly be obtained from some one doing concrete construction work in your vicinity.

While it is not absolutely necessary it is advisable to coat the inside of the tanks with an asphaltum similar to one made up from coal tar pitch and coal tar.

Tanks made from wood and lined with lead with burned-in seams and afterwards coated with asphaltum are very lasting and have been in constant use in some plating plants for over twenty years. When properly built they will never leak.

Steel welded or boiler riveted tanks will be found superior for brass solutions, because it is frequently necessary to apply heat to such solutions in order to obtain the best results. The anode side of iron or steel tanks should be protected with a wooden lining, extending at least six inches below the anodes to prevent polarization between the anodes and the tank.—C. H. P. Problem 2,704.

TUMBLING

Q.—What will work in ball tumbling to give a bright color on steel; also for brass, as I do not want to use too much cyanide?

A.—Use either of the following formulae for producing a bright and clean finish on steel by wet tumbling method:

1.

Water	1 gallon
Tri-sodium phosphate	3 ounces
Sodium cyanide	½ ounce

2.

Water	1 gallon
Soda ash 58%	4 ounces
Sodium cyanide	½ ounce

It is possible that these proportions may be reduced one-third if the steel parts are not too dirty. For tumbling brass parts use

Water	1 gallon
Tri-sodium phosphate	2 to 3 ounces
Sodium cyanide	¼ to ⅓ ounce

or

Water	1 gallon
Cream of tartar substitute	2 to 3 ounces

In ball burnishing brass a good combination is

Water	1 gallon
Borax (powdered)	1 to 2 ounces
Powdered olive oil soap	¼ to ½ ounce

Soap bark may be substituted for the olive oil soap.—C. H. P. Problem 2,705.

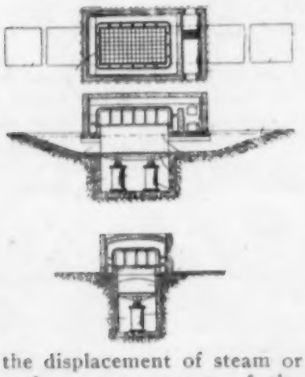
PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

The age of these patent notices is due to the delay in the issuing of patent reports.—Ed.

1,292,617. January 28, 1919. **Annealing-Furnace.** Victor E. Lane, of Detroit, Mich.

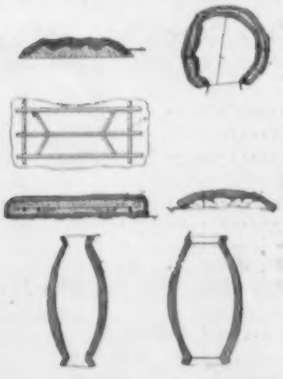
The invention relates to furnaces designed for annealing or otherwise heat-treating metal, and it is the object of the invention to prevent the corrosion of the surface of the work through contact with atmosphere containing free oxygen. It is a further object to provide means for easily inserting and withdrawing the work without breaking the seal.



With the construction, as shown in cut, heat within the combustion chamber is obtained by any suitable means and the muffle is heated thereby to the desired temperature. The space within the muffle is cleared from free oxygen by the displacement of steam or a neutral gas, and the water-seal prevents access of the external atmosphere. When the proper temperature is attained the work to be heat treated is slid down one of the inclined ends of the tunnel and pushed inward upon a table. The jacks are then operated to lift the table, which carries the work upward above the water seal and into the heated chamber. After the completion of the heat treatment the table is again lowered, which will plunge the heated work into water and will cool the same to a temperature below the oxidizing point. The work may then be withdrawn through the opposite end of the tunnel and new work introduced in the manner before described.

1,296,453. March 4, 1919. **Process of Galvanoplasty.** Blasius Bart, of Providence, Rhode Island, Assignor, by Mesne Assignments, to Dymalkon Metals Corporation, of Croton-on-Hudson, New York, a Corporation of New York.

This invention relates to a new process of galvanoplasty which makes it possible to obtain by means of electro-chemical steps copies in all sizes, reproducing every feature and detail of the model. The copies can be made entirely in one piece having a uniform thickness, and they can be made with the same facility, whether they are in relief or hollow pieces.

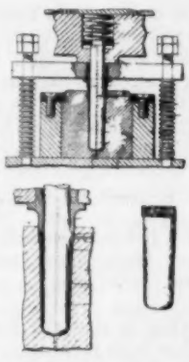


The essential features of this process are, the formation of a matrix on a model to reproduce each detail, and of any size, to form this matrix entirely of a metallic substance of high electrical conductivity to receive the electrolytical deposits and to apply a non-conductive covering for parts of the matrix on which no electrolytical deposits are to be had.

Referring to the drawing in which the several steps used in this process are shown, there is a pattern which may be made of metal, wood, plaster, wax or gelatin or the like and on this pattern a matrix is made by means of vaporizing or impinging a metallic vapor on the whole surface of said metal. This is accomplished by means of a sprayer or atomizer, taking care that the metallic matrix obtained shall have sufficient thickness.

1,295,430. February 25, 1919. **Method of Metal Drawing.** H. G. Carlson, of Worcester, Mass., assignor to Rockwood Sprinkler Company of Massachusetts.

This invention is an improvement over a prior Patent No. 1,200,309, patented October 3, 1916, and relates, as that does, to a method of producing a hollow article of sheet metal such as a shell or booster casing which may be used for many purposes in accordance with its particular size and shape. A characteristic feature of the article, however, is that it varies in thickness from its closed end to its open end, being thicker at the open end, and cylindrical inside, but conical outside. Also it may have in addition an integral enlargement at its open end formed by a thickening process instead of being doubled over or creased, so that it has no internal seam.



The principal objects of this invention are to provide a method of producing an article such as above described, but of superior character and with the employment of comparatively little power, and particularly to provide means, as shown in cut whereby by a simple drawing operation the interior of a shell-shaped article can be left in a uniform and smooth condition, and an article finally shaped up to the desired definite shape.

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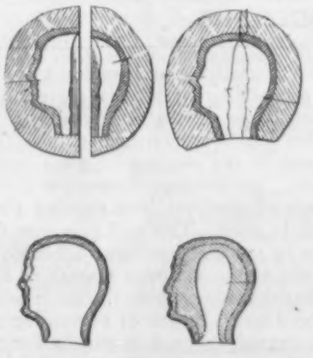
4. A soldering flux including a fused mixture of sodium and potassium chlorids into which are fused zinc and ammonium chlorids.

5. A method of forming a soldering flux that comprises fusing a mixture of sodium and potassium chlorids together and adding metallic chlorids while the mass is maintained in a fused condition.

1,296,498. March 4, 1919. **Process of Reproducing Articles in Metal.** Antal Fodor, of New York, N. Y., Assignor to Dymalkon Metals Corporation, of New York, N. Y., a Corporation of New York.

This invention relates to a new process for reproducing articles in metal such as statues, busts, signs and figures of all kinds.



An object of this invention is the production of artistic figures of metal in an economical fashion and which will be faithful to the original reproduced.

Another object of the invention is to substitute for the present costly process of casting in metals a process, as shown in cut, which will be time and labor saving and which will permit the sale of such reproductions nearly at the price of ordinary plaster cast figures.

The essential features of the process are the making of a negative mold from an original in one or more parts, the reproduction of a positive copy in a thin sheet from said negative mold in one or more parts, and the subsequent treatment of the positive copy so produced.

1,294,001. February 11, 1919. **Dry Galvanizing.** D. R. Ward of Struthers, Ohio, assignor to the Ward Nail Company, of the same place.

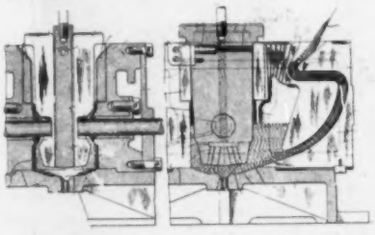
The present invention relates to dry galvanizing, or the well known process in which the surfaces of metallic articles are coated with zinc by applying to such surfaces pulverulent zinc, and heating the same.

The object of the invention is to produce a cheaper and more rapid method of dry galvanizing and a method by which an improved product is obtained.

In carrying out dry galvanizing, according to the method of the present invention, pulverulent or finely powdered zinc is mixed with graphite. The graphite is preferably in the form known as commercial flake. The zinc and graphite are thoroughly mixed, preferably by tumbling, which apparently serves to coat each particle of zinc with a thin surface film of graphite. This thin inert film prevents the particles from fusing when heated. The graphite also acts as a lubricam between the zinc particles, and the mixture flows much more readily between and around the articles to be galvanized. The surfaces of the articles to be coated, which are usually of iron, are cleaned in the well known manner. Then the articles to be coated are placed in a closed vessel or drum, together with the mixture of zinc and graphite. The drum and its contents are then heated to the degree of heat usually employed in dry galvanizing. After the drum and its contents are allowed to cool. the articles which have been coated with the zinc are removed.

1,296,597. March 4, 1919. **Mold and Process of Casting.** Frederic A. Parkhurst, of Cleveland, Ohio, Assignor to the Aluminum Castings Company, of Cleveland, Ohio, a Corporation of Ohio.

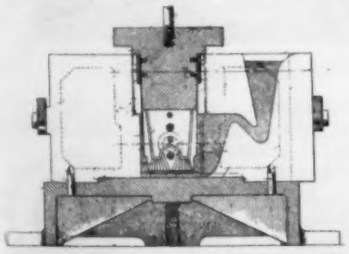
This invention relates to permanent molds adapted for casting articles from metals and metallic alloys, such as aluminum and aluminum alloys, and it has been developed in connection with molds of the type invented by J. H. Bamberg, then of Buffalo, New York, and A. B. Norton, then of Detroit, Michigan, said molds being especially adapted for the production of cup-shaped castings such as skirted or trunk pistons for internal combustion engines. More particularly, the improvements have to do with the gate of the mold and the means for venting the mold cavity, and to an improved process of introducing the molten metal into the mold cavity.



One of the objects of the invention is the provision, as shown in cut, of an improved form of gate for molds having substantially all of the advantages of the prior forms of construction above referred to and which is exceedingly compact in form whether used for the production of large and tall castings, on the one hand, or small and short castings, on the other hand, so that a mold of minimum size and weight is secured for castings of any size.

1,296,588. March 4, 1919. **Metal Mold.** J. H. Bamberg, Tonawanda, New York. Assignor to Aluminum Castings Company, Cleveland, Ohio.

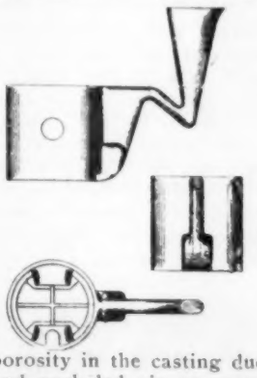
This invention relates to molds adapted to receive molten metal or metallic alloys, such as aluminum or aluminum alloys, and more particularly the invention relates to permanent molds each comprising a plurality of sections or parts constructed and correlated to form a complete mold cavity.



One object of the invention is to provide, as shown in cut, an improved permanent mold including the core, adapted for the easy and rapid casting of cup-shaped articles (such as pistons for operation within engine cylinders) which may be equipped with inwardly extending bosses, ribs, extensions, etc., and the sections of which may be so constructed and correlated that in casting, the metal will quickly flow through and to all parts of the mold cavity, and which may be readily and quickly separated to permit the removal of the casting without damage thereto.

1,296,594. March 4, 1919. **Mold.** Allen B. Norton, of Detroit, Michigan, Assignor to the Aluminum Castings Company, of Cleveland, Ohio, a Corporation of Ohio.

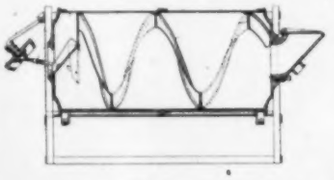
This invention relates to permanent molds adapted for casting articles from molten metal or metallic alloys, such as aluminum and aluminum alloys; more particularly the present invention relates to the construction, as shown in cut, of the gate through which the molten metal flows to the mold cavity and the relation thereof to the said mold cavity.



The invention has for some of its objects the provision of an improved gate for a mold adapted (a) to control the flow of metal to the mold cavity to properly fill the same, (b) to feed the metal to the mold cavity in a manner conducive to the proper setting of the casting and tending to prevent porosity in the casting due both to crystallization shrinkage and occluded air or gases and to prevent the entrance of oxids and other foreign materials into the mold cavity.

1,297,400. March 8, 1919. **Tumbling Barrel.** Nathan Ransohoff, Cincinnati, Ohio.

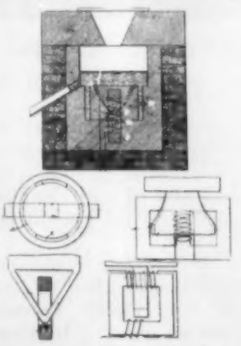
This invention relates to receptacles for holding metal parts which are shaken up and rolled around upon each other to smooth off and polish the edges by rotating or rocking the vessel in which the articles are placed. These receptacles are usually in the shape of a cylindrical barrel, with an opening in the side for charging and discharging the metal parts, and with this construction it is of course necessary that for charging the tumbling barrel the opening should be at the top, and for discharging the opening must be brought to the bottom, and it therefore follows with the usual construction that the apparatus has to be stopped during the loading and unloading.



It is the principal object of the invention to provide a construction, as shown in cut, which can be loaded and unloaded while running and which can be arranged to discharge into a wheelbarrow or other receptacle while rotating, and which may be equipped with a power loader for depositing in the barrel a complete batch from the ground level.

1,296,752. March 11, 1919. **Electric Induction Furnace.** Oscar Brophy, of Philadelphia, Pa.

One object of the invention is to provide a relatively simple efficient and substantial form of electric furnace, as shown in cut, which shall be characterized by the novel form of its molten metal secondary as well as by the position and form of its primary relatively to said secondary;—the invention especially contemplating the mounting of the primary and secondary elements of the furnace in such relation as will insure brisk circulation of the molten metal.



It is further aimed to provide an induction furnace in which the primary and secondary elements are so constituted and assembled that the molten metal is caused to circulate by reason of the repulsion exerted by the primary winding upon the secondary as well as by reason of the cutting of the molten metal at definite points by relatively large numbers of lines of force.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

CONTINUOUS CASTING CORPORATION

During the year 1914 several patents were granted to Grenville Mellen for a continuous casting machine (THE METAL INDUSTRY, May, 1914). In the October issue of THE METAL INDUSTRY of the same year a complete description of the casting machine was published. It is not necessary for our purpose to do more than to refer briefly to the machine and its product. The Mellen machine consists of an upright or horizontal frame, water cooled, supporting a mold made in two halves in the form of an endless chain. The metal for making rods, whether a copper alloy or white metal, is poured from a container into the moving mold. The metal is chilled and then is carried to the other end of the machine in the form of a continuous rod whose length is limited only by the amount of metal available for pouring.

In 1914 a company was formed at Garwood, N. J., under the title of the Continuous Casting Corporation to manufacture these machines and to market their product in the form of rods. The accompanying photographs will give some idea of how the business has grown from the first little foundry to the present impressive plant.

It was soon found when the demands for rod, due to the war, increased so enormously that the casting machine had its limits. In order then to keep abreast of their rapidly growing business the company installed some twenty pit fire furnaces, molds and muffles and went into the rod business in a regular way. They at the same time were operating a machine shop and were building rod, tube and wire drawing machinery and also rod rolling mills. So here we have a unique plant, started to make use of their own invention and growing to such size that they can make and install their own rod mills, rod, tube and wire draw benches and machinery. We believe they stand alone in this respect and it is no secret that they confidently expect to be forced to add more building and equipment to the present installation. The pictures shown here tell the story better than words.

Referring to the photographs, Fig. 1 gives a general view of the rod mill. Here the castings are brought after being cast, rolled, annealed, pickled and overhauled, and are then run or drawn down into smaller size tubes, rods and wire.

FIG. 1. VIEW OF MAIN ROD AND TUBE MILL, CONTINUOUS CASTING CORPORATION, GARWOOD, N. J.

Here are seen the straightening, pointing and other special machinery designed and manufactured by the company for their own use. Fig. 2 shows the pickle tubs, which are tucked away in a pocket out of the way. The metal is conveyed in and out by an electric hoist running on an overhead track, thus minimizing the amount of handling and labor required. Fig. 3 gives a good view of the machine shop where the company builds its special line of machinery such as draw benches, rolling mills, straighteners, bull blocks, pointers, coilers, cutters, and in fact anything needed for their own use and for the outside trade as well.

The present officers of the company are Grenville Mellen, president and general manager; Edward W. Weld, chairman; Spencer Waters, vice-president and treasurer, and Arthur T. Rutter, secretary and sales manager.

THE USE AND ABUSE OF CRUCIBLES

By A. C. Bowles.*

A few days ago, a local foundryman called me up and complained, in language more forceful than elegant, that the last batch of crucibles he had received "was rotten" and that they fell to pieces before he was able to get even one heat out of them. He asked indignantly what we were going to do about it. Of course, I told him that I was sorry to hear that he had trouble and that we would make good any crucibles proved to be defective, but that I would like to see the crucibles to determine, if possible, the cause of their failure. To make a long story short, he had attempted to dry them in the moist atmosphere of the core-oven, with the inevitable result that they had scalped upon coming into contact with the fire.

Crucibles respond so readily to proper treatment, that it is worth while emphasizing again the few points that have to be observed if the maximum of service is to be obtained from graphite pots. There is nothing new about the right procedure. Most crucible users have known it, but probably on account of the stress of business during the past few years, have neglected to make use of their knowledge.

The manufacturer is not infallible and occasionally a bad batch of pots slips through, but the complete system under which he works, and the long years of practice in repeating the same operation, reduce the chances of mistakes on the part of the factory to the minimum. It is safe to say that 90 per cent of the failures of crucibles are traceable directly to poor treatment on the part of the user.

The principal cause of the failure of crucibles is the lack of proper annealing. When the crucible comes from the kiln it contains but ¼ per cent of combined moisture, and in this condition it is impossible to scalp it. However, during transportation from manufacturer to user, it, like salt, absorbs moisture from the atmosphere, and once absorbed a temperature of not less than 250 degrees F. is required to dispel this moisture.

Most crucible troubles occur in small shops. The large consumers have found it well worth while to equip their plants with drying-ovens especially to dry and anneal their crucibles before they are put into the furnaces. Whether annealing in a special oven or on top of the crucible furnace, there are four points that must be observed.

1. The temperature must go above 250 degrees F.
2. This temperature should be reached gradually.
3. This temperature must be held a sufficient time to allow the moisture to thoroughly disappear.

FIG. 1—A VIEW OF THE PICKLE TUBS AT THE PLANT OF CONTINUOUS CASTING CORPORATION, GARWOOD, N. J.

4. The crucible must go into the fire with a temperature above 250 degrees F.

It is a mistake to think that after the first three rules have been followed, the crucible has had its annealing and is impervious to moisture, for, if allowed to cool below 250 degrees F. it will again take up moisture just as readily as the first time.

Another enemy of the crucible is mis-shapen tongs. When the crucible is hot, it is in a somewhat plastic condition and is easily squeezed out of shape or ruptured. The best tongs are the basket variety which grab the crucible both below and above the bilge and hold it firmly without squeezing. It has been found good practice to have an iron crucible cast, over which the tongs can be straightened and shaped at frequent intervals. This method

*Joseph Dixon Crucible Company, Jersey City, N. J. Booklet 12A.

is not only much quicker and simpler, but gives a better result than sending to a blacksmith. Some shops find it advisable to have tongs of two sizes; one for the new crucible and one for the old pot, which is considerably smaller.

In using an oil-furnace, the flames should never be allowed to play directly on the crucible, as scoring will follow, and the crucible will soon wear through on that side. In addition, one side will heat faster than the other, which is also bad practice. Oil-furnaces giving a rotary flame, seem to be the most satisfactory and to give the most even heat on all sides of the crucible.

The use of wet coke is also bad practice because steam comes in contact with the crucible and forms checks known as alligator-cracks. These will likewise form when a crucible is exposed to the moist gases on top of the furnace, while it is being annealed. Therefore care should be taken when annealing a crucible on top of the furnace, to see that it is kept away from direct contact with the flame.

FIG. 3—THE MACHINE SHOP OF THE CONTINUOUS CASTING CORPORATION AT GARWOOD, N. J.

The activities of the furnace-tender with his iron poker often shorten the life of the crucible. Many shops make a practice of keeping account of the number of melts each tender gets from a crucible so that the careless tender can be checked, and the average number of heats increased.

The number of heats obtainable from a crucible depends largely on the metal to be melted, and on the temperature required for the melt. A crucible that will last only three or four heats with nickel will last 25 heats with copper, or 40 or more with composition metal. If a flux is used, it lowers the life of the crucible by attacking the clay that holds the graphite together.

In general poor results are caused to a large extent by poor treatment. More attention to the details of storing and annealing the pots and to their treatment while in the furnace will pay large dividends in the increased service obtained.

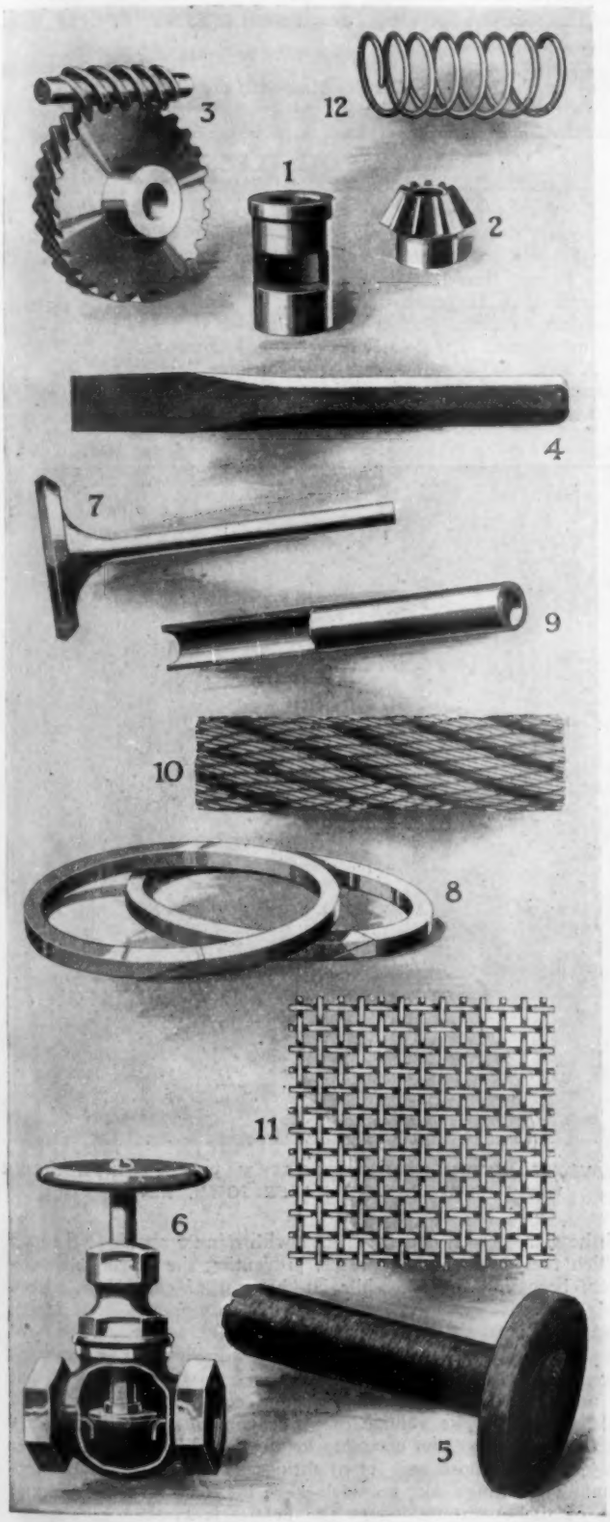
BRITISH ALUMINUM COMPANY, LTD.

Owing to the greatly increasing business of the British Aluminum Company and to their policy of carrying a stock of nearly 100 tons of aluminum for the benefit of their Canadian customers, they have removed to larger and more convenient office and warehouse premises. The new Canadian Headquarters of the company are now at the Purman Building, 265 Adelaide Street West, Toronto. The office, warehouse and stock rooms are very large and well appointed, having a frontage of nearly 100 feet on Adelaide street, and anyone interested in aluminum will find it well worth his while to pay a visit to these premises where a permanent exhibition of the different applications of the metal is always on view. In addition to this extension the company is endeavoring to take care of its increasing business by augmenting its staff in the Toronto office and a well known expert on aluminum, E. T. Driver, B. Sc., will shortly take up the position of technical adviser.

The war has been the greatest advertisement which aluminum ever had. To meet the many varying conditions of service new and intensive means of production have been devised and in one particular direction, viz. in the production of new alloys the increased knowledge of the last four years has been more than was ever known about aluminum alloys before.

Business in general is rapidly adjusting itself to the conditions of peace and aluminum is every day in stronger demand for the manufacture of kitchen utensils and specialties, the construction of automobile bodies and parts, and for wire and cable and other uses in the electrical field.

LITNUM BRONZE



VARIOUS ARTICLES MANUFACTURED FROM LITNUM BRONZE.

1—Bearings. 2—Gears. 3—Worm Gears. 4—Chisels. 5—Forgings. 6—Valves. 7—Poppet Valve. 8—Piston Ring. 9—Tubes. 10—Wire Rope. 11—Wire Screen. 12—Spring.

The articles shown in the accompanying illustrations are made of Litnum bronze, a composition of copper, aluminum and iron, now being marketed by the American Industrial Engineering Company, Chicago, Ill., as general sales agents for the Litnum Bronze Company.

It is stated that Litnum bronze is a composition containing practically 80 to 85 per cent of copper, 10 to 15 per cent. of aluminum and approximately 4 per cent. of iron. While Litnum bronze appears to resemble the well known alloys called aluminum-bronze which have been on the market for a number of years, it is claimed by the producers that it possesses inherent qualities which make it superior to anything yet produced.

Certain tests have been made of this material and they are published by the Litnum Bronze Company as follows:

CAST BAR.

Tensile strength per square inch	75,757 pounds
Elastic limit, per square inch	52,575 pounds
Elongation	37.5 per cent.
Reduction of area	31.3 per cent.
Shore scleroscope test	18

FORGED BAR.

Tensile strength per square inch	92,150 pounds
Elastic limit, per square inch	56,210 pounds
Elongation	44.2 per cent.
Reduction in area	41.3 per cent.
Shore scleroscope test	23

It is claimed by the makers that the metal in a cast form has a very fine structure and produces a homogeneous casting which is free from blow-holes and other imperfections. Some of the qualifications of this alloy which make it suitable for various applications are listed as follows:

Litnum bronze is adapted for bearings, bushings, turbine buckets, wire, springs, tubes for super-heated steam, chemical tubes of all description including salt refineries, gears, bolts, nuts, condenser plates, boat shafting, pump pistons, pump impellers, spark-plugs, needle valves for carburetors and on account of its non-corrosive properties for all sorts of alkali and acid fittings and especially so in connection with super-heated steam, etc. Its scope in the engineering field is said to be unlimited.

ACTIVITIES OF A. P. MUNNING & COMPANY

Recent orders of interest placed with A. P. Munning & Company, manufacturers and dealers in platers' supplies, New York, included the following: Twenty-five tons of Zucker's Acme Brand tripoli composition by the Edmunds & Jones Corporation, Detroit, Mich. J. C. Rhodes Company, New Bedford, Mass., have added an Optimus motor generator set and two additional double Optimus plating barrels to their original equipment. The Ford Motor Company, Detroit, Mich., have ordered two additional Optimus generator sets.

The new trade mark adopted by A. P. Munning & Company is a combination of "the Zucker diamond," the trade mark of George Zucker Company, organized in 1863, and the triangle of the Munning-Loeb Company, incorporated in 1911, and therefore aptly expresses the merger of these two well known concerns.

They also sell the Optimus Generator and other plating apparatus, notably the Broderick Machine for continuous and automatic cleaning and plating, the Triplex Buff and other articles which make for increased efficiency and economy in plating and polishing rooms.

The personnel of the company is of high character, and an important feature of the service given customers is expert engineering advice with regard to the solution of electro-plating problems.

The main office of the company is in the Hudson Terminal, 50 Church street, New York, and the Western Headquarters are at 2920 Carroll avenue, Chicago, Ill. There are sales offices in New York, Chicago, Detroit, Philadelphia, Cleveland, Springfield, Mass., and Rochester, N. Y. The Pacific Coast agents are Berger & Carter Company, owners of the Pacific Coast Tool & Supply Company, San Francisco and Los Angeles, Cal., Portland, Ore., and Seattle, Wash. The Cutter & Wood Supply Company of Boston, Mass., serve the eastern New England trade.

TYPE "K" AUTOMATIC BUFFING MACHINE

The illustration shows the sixteen spindled improved type "K" automatic buffing machine manufactured by the Automatic Buffing Machine Company, 52 Indiana St., Buffalo, N. Y. These machines are also furnished with eight or four spindles as required, depending upon the size of the articles to be buffed. Only one spindle is in motion at one time, that being the one at the left of the horizontal center line. The other spindles being entirely free from the mechanism that revolves them while the articles are in contact with the buff wheel.

The machine, the manufacturers state, has three adjustments for time. The article to be buffed is held against the buff wheel

TYPE K AUTOMATIC BUFFING MACHINE.

and revolved. These periods of time vary as the revolutions of the work which is against the wheel. For instance, if it is determined that the work shall be revolved at 30 R. P. M., then adjustment can be made to hold the work against the wheel three seconds, after which the head supporting the spindles is automatically revolved, bring the next article into contact with the wheel. If three seconds is not sufficient time in which to buff the work in hand, the work period may be changed to six or twelve seconds as required.

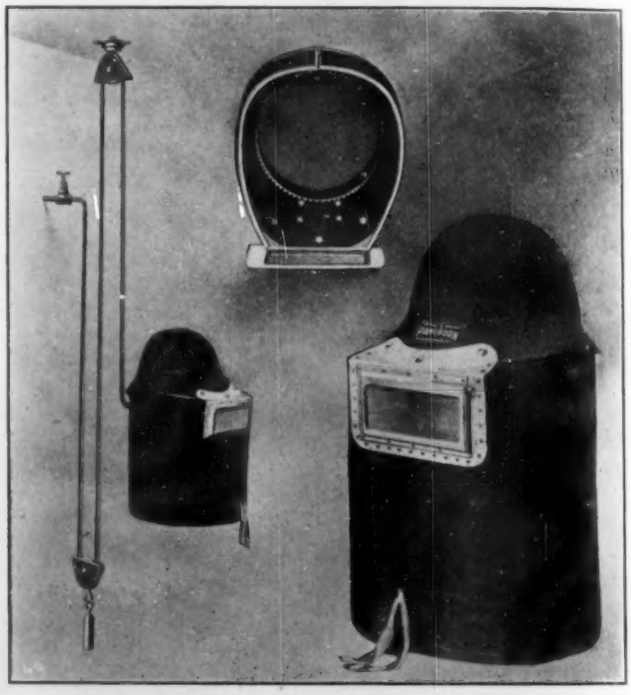
Chucks for supporting the work, designed to suit each article, are attached to the ends of the spindles by headless set screws. The operator stands at the opposite side of the machine from the buff wheel and places the work on the spindle nearest him. In many instances the work, after being buffed, is kicked off by means of pins projecting through the hollow spindles, but this is not practicable with some articles and in such cases the operator removes the finished work by hand. The head of the machine can be adjusted to any angle, presenting the outside circumference, or the bottom or face of an article to the buff wheel. The cross slides also allow for adjustment across the face of the wheel and for wear of the buff wheel. The machine is driven from the counter by a telescopic shaft, having two universal joints, one of which is shown in the illustration. The price of this machine including counter-shaft is $350.00 F. O. B. Buffalo, New York.

Further particulars regarding the Type "K" buffing machine may be obtained by corresponding with the above company.

VENTILATED DUSTLESS HELMET

In the operation of a sand blast room some provision is necessary for the protection of the worker against bad effects of the dust that is involved in the work. The ventilated dustless helmet shown in the cut is manufactured by the Pangborn Corporation, Hagerstown, Md., P. O. Box 854, and is claimed by them to afford perfect protection, with lightness and freedom of movement. The helmet operates as follows:

A small flexible hose carries a constant flow of air from the compressed air line into the crown of the helmet and passes down through the corrugated cork sweat band. Over the inside



A VENTILATED DUSTLESS HELMET, MADE BY THE PANGBORN CORPORATION, HAGERSTOWN, MD.

of the sight screen is a small tube with minute openings through which the air constantly passes, preventing the screen covering from becoming fogged, while another set of small jets, placed on the outside prevents the settling of dust on the sight screen and obscuring vision. A fine substantially woven screen protects the celluloid front from flying abrasive. The constant flow of air to the inside of the helmet has a cooling effect that is most welcome in hot weather and causes no discomfort in cold weather. The volume of air is controlled at the pleasure of the operator. The complete helmet is equipped with 15 feet of ¼ inch i.d. hose and set of fittings as shown in the illustration. The fittings take up slack, keep the hose off the floor and out of the operator's way. The helmet is stocked in sizes of 6⅞, 7 and 7⅛.

ZINC RUNNING BOARDS

Checkered coverings for wooden running boards and mouldings on the edges of linoleum covered running boards found on many late automobile models are made of rolled zinc, this metal having replaced certain other materials used by manufacturers in the past.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN ELECTRO PLATERS' SOCIETY'S ACTIVITIES

BRIDGEPORT BRANCH BANQUET

The sixth annual banquet of the Bridgeport branch of the American Electro Platers' Society was held at the Stratfield Hotel at Bridgeport, Conn., Saturday, May 3, 1919, about 100 members and friends attending. Judging from the execution done by the banqueters, the $2.50 per plate dinner was enjoyed by everyone present at the affair. A menu of exceptional excellence was served by the management of the Stratfield, an orchestra of four pieces providing music during the feast.

The toastmaster of the evening was J. M. Dunn, who at the end of the banquet made a few brief remarks, introducing the speaker of the evening, Dr. W. Blum, chemist at the U. S. Bureau of Standards, Washington, D. C.

Dr. Blum delivered a very interesting address on education, as it applies to the electro-platers and their associates. He divided his remarks into three sections dealing with the employers, the chemists and the electro-platers themselves.

"The electro-plating business," said Dr. Blum, "is what might well be called a 'keystone' business. In England, during the recent war, they classified many of the businesses and industries as 'keystone,' an example of this being the dye industry. Although the dye in a suit of clothes may not amount to much in money, it is just as necessary to the suit of clothes practically as the cloth itself, for without it we would all be wearing homespun."

In taking up the electro-plater's education, Dr. Blum advised them to take their troubles to the chemist, but further than that, to observe and classify their results themselves. "There is not one of you here," said the doctor, "that cannot get a little notebook and in it record the results of your different solutions, their reactions and results. Even if there is no chemist in your plant, keep this record, anyway, for it is only by observation work such as this, that the science of electro-plating can be furthered. In future years it is entirely possible that some little note you take within a short time may be the means of almost revolutionizing the electro-plating industry."

The second speaker of the evening was George B. Hogaboom, connected with the Bureau of Standards during the war. Mr. Hogaboom, in a short address, urged employers to aid the Bureau of Standards and the American Society of Electro-Platers in their research work, pointing out that it was not a charity act but one that would react ultimately to the great benefit of the manufacturers.

Before and during the speaking at the banquet there were several musical selections. Miss Mary A. Maraffi rendered a very pleasing piano solo, impromptu, and Mrs. T. F. Slattery a violin solo, souvenir. Both ladies received generous encores from the banqueters. Thomas Slattery, in a vocal solo, "In the Garden of the Gods," also came in for rounds of hearty applause.

The banquet committee was composed of J. M. Dunn, W. G. Stratton, Royal F. Clark, E. A. Maraffi, William Thompson and T. F. O'Brien. The officers of the Bridgeport branch are: President, J. M. Dunn; vice-president, T. F. Slattery; secretary-treasurer, Royal F. Clark; librarian, E. A. Maraffi, and sergeant-at-arms, F. W. Joseph. The board of managers comprises W. G. Stratton, David Fleming and John Hall, while the laboratory committee numbers J. M. Dunn, W. G. Stratton, E. A. Maraffi and Benj. Kusterer.

Before the banquet an interesting exhibit in one of the smaller dining rooms was enjoyed by the members and guests. Among the exhibitors were the following firms: American Chain Company of Bridgeport, exhibit of chains, represented by M. Messick; Conwall and Patterson, represented by J. Slattery, exhibit of piano and organ hardware; Artistic Bronze Company, represented by E. A. Maraffi, exhibit of ornamental hardware; Yost Typewriter Company, represented by T. F. O'Brien, exhibit of typewriter parts; Hawthorne Mfg. Company, represented by Louis Maraffi, exhibit of lamps; Bennett and Seeley, represented by E. E. Seeley, exhibit of electro-plating supplies; Waterbury Button Company, represented by Dayton Lasher, exhibit of buttons; American Fastener Company of Waterbury, represented by E. J. Burke, exhibit of fasteners; North and Judd of New Britain, represented by Frank Budetz, exhibit of cast iron plated buckles; S. L. and G. H. Rogers of Hartford, represented by C. E. Dunn, exhibit of silverware; Eureka Pneumatic Spray Company of New York, represented by H. A. Schwarz, exhibit of pneumatic spray; Celluloid Zapon Company of New Haven, represented by J. Stevenson, exhibit of building hardware; Colt Automatic Pistol Company of Hartford, represented by G. E. Vibberts, exhibit of automatic pistols; Holmes and Edwards Silver Company, represented by J. M. Dunn, exhibit of electrolytic analysis outfit; Apothecaries Hall Company of Waterbury, exhibit of Wyandotte Cleaners and Targol; Stanley Insulating Company of Great Barrington, Mass., exhibit of Ferrostat vacuum bottles.

Among the guests at the banquet were the following: T. D. Haddow, president of the New York branch of the society; William Bailey, Washington N. E. Dabolt, New York; William Snyder, New York; F. J. Clark, Springfield; C. Frey, New York; G. Grant, Boston, Mass.; A. J. McDermid and Harry Jonquest, Waterbury, Conn.; Royal F. Clark, South Norwalk, Conn.; T. F. Slattery, New Britain, Conn., and G. J. Karl of New York.

L. M. P.

NATIONAL CONVENTION NOTES

The 1919 national convention will be held in Philadelphia, Pa., July 1, 2 and 3, the Hotel Bellevue-Stratford, Broad and Walnut streets, having been selected as convention headquarters.

An interesting meeting was held at the University of Pennsylvania by the Philadelphia Branch, Friday evening, May 2. It was the consensus of opinion that the days mentioned above should be devoted to business and entertainment—"fifty-fifty"—the mornings to be devoted to business and the afternoons to entertainment and pleasure. The evenings of July 1 and July 2 will be devoted to business and the evening of July 3, the last evening of the convention, will be devoted to banquet. Arrangements are being prepared for the purpose of chartering a steamboat on the Delaware River so that the visiting delegates might receive an adequate idea of Philadelphia's water line. Automobiles will be engaged for one afternoon when Fairmount Park and the suburbs of Philadelphia will be covered.

M. Smith, chairman of the badges and printing committee, stated that 300 general badges have been ordered. This badge will consist of a wide red, white and blue ribbon with Independence Hall and a real facsimile Liberty Bell as pendent. Seventy-five additional special badges were ordered for delegates and committeemen. He also reported the ordering of five hundred menu cards for the banquet, five hundred admission cards for banquet and five hundred registration cards.

E. T. Homan, chaircan of the reception committee, reported progress.

D. A. Metz, chairman of the information committee, reported that his committee was preparing data and would be ready to answer all questions propounded by the visiting delegates.

Walter C. Gold, Chairman of the program and publicity committee, reported in writing. This report showed that a total number of 293 letters had been sent out to members of branch societies where the secretaries of those branch societies had sent in the roster. He also reported that he had addressed letters to the secretaries of the remaining branches urging them to send in their list so that these letters of invitation could be sent out to the other members. These letters of invitation urged the member to consult with his secretary with the view of attend-

ing the convention. In the letter was enclosed a copy of "Strangers' Directory of Philadelphia." There was also enclosed a souvenir booklet of the Hotel Bellevue-Stratford. Mr. Gold also reported that the souvenir program would be mailed to each member of the society the forepart of June.

W. P. Scott, chairman of the exhibit committee, reported that spaces in the exhibition room had been snapped up. The Hotel Bellevue-Stratford donates the exhibition room without charge so that the receipts from exhibitions will afford a nice profit which will be used in entertaining the visiting delegates.

S. D. Benoliel, chairman of the educational committee, reported that Provost Edgar Fahs Smith of the University of Pennsylvania, had agreed to address the convention at the Hotel Bellevue-Stratford on July 1. Dr. Smith is widely known by the members of the American Electro-Chemical Society and by the members of the American Electro-Platers' Society. The Philadelphia branch considers itself extremely fortunate in securing this widely known gentleman as a speaker. Mr. Benoliel reported that he was in touch with Dr. Smith with a view of securing his assent to deliver his lecture on "Electro Analysis," which covers the rapid methods of analysis of metals by deposition. This lecture is exceedingly interesting and is one which can be used by many platers in determining the metal contents of their solutions. The chairman also reported that Charles H. Proctor, founder of the American Electro-Platers' Society would read a paper on "Standardization of Platers' Solution—How We Can Best Adopt Standardization for Individual Plants." He also stated that W. J. Schneider will read a paper on "Lead Cyanide Plate." Mr. Benoliel will read a paper on "Cleaners for Metal Work." There will also be a few other prominent speakers.

W. J. Bell, chairman of the entertainment committee, reported that arrangements were being made for generous entertainment of the delegates. The full program of the entertainment committee will be reported in the souvenir program.

The next meeting will be held at Dooner's Hotel, Philadelphia. At this meeting there will be a general round-up of the Philadelphia members. The local society is determined that every man shall come out for this convention. The arrangements that have been made indicate that this certainly will be "the best-ever" convention.

Grand Rapids Branch. Meets second Wednesday of the month at Union High School. Secretary, John C. Knape, 1014 Scribner avenue, Grand Rapids, Michigan.

The first annual banquet of the Grand Rapids Branch was held on Friday, April 25, at the Pantlind Hotel club dining room. About 50 members and guests sat down to the excellent menu provided by the genial Fred Pantlind.

After discussing all the good things to eat, assisted by some good music furnished by the Wolverine Brass Company quartette and their accompanist, the balance of the evening was taken up by a very instructive and entertaining program, as follows:

Welcome to our guests by Toastmaster Fitzsimmons and the reading of a letter from J. H. Hansjosten regretting his inability to be present; also a telegram to the same effect from Oscar Servis. E. Lamoureux was then introduced and spoke on the benefits and accomplishments of the American Electroplaters' Society.

Cincinnati Branch—Meets first Friday of the month at Dennison Hotel, Cincinnati, Ohio. Secretary, W. J. Husing, 741 Circle avenue, Cincinnati, Ohio.

The first annual banquet of the Cincinnati Branch was held at the Chamber of Commerce on April 12, 1919. Walter Fraine, national president, was the speaker of the evening, and he gave a detailed description of the work of the society. George K. Elliott, chief chemist and metallurgist of the Lunkenheimer Company, delivered an address covering some metallurgical notes which proved very interesting and instructive. R. G. Sliter, of the Celluloid Zapon Company, also addressed the meeting in his usual humorous and capable manner. A paper by Thomas Whitehead on "Industrial Training" was also presented.

New York Branch—Meets second and fourth Fridays of each month at 32 Union Square, Room 714, New York City, at 8 P. M. Secretary, William Fischer, 300 St. Anns avenue, New York City. The April meetings of the New York Branch had the usual attendance. Two new applicants, Messrs. B. Dietric and W. McConnel were elected to active membership. Messrs. Burke and Shuman exhibited some very fine samples of staining on which they have been experimenting at the branch laboratory, and it is the intention of Messrs. Burke and Shuman to prepare a paper giving full data on these experiments which will be read at the annual convention at Philadelphia.

Pittsburgh Branch—Meets first and third Saturday at the Central Branch Y. M. C. A. S. E. Hedden, secretary, 227 Fifth street, Aspinwall, Pa.

A new branch of the American Electro-Platers' Society was organized at Pittsburgh on April 15 with fourteen members. The president of the new branch is N. E. Zadowski, of the Pittsburgh Lamp, Brass and Glass Company, and the secretary and treasurer is S. E. Hedden, of the Enameled Metals Company, Etna, Pa. The officers of the branch expect that it will in time mean a great deal to the platers of the Pittsburgh district and expect also that it will grow to equal the other branches of the society.

NATIONAL ASSOCIATION OF PURCHASING AGENTS

The National Association of Purchasing Agents, 25 Beaver street, New York, an organization of the buyers of all industries of this country, is solidly behind the bill now pending in the United States Senate intending to make both the giver and the recipient of a commercial bribe guilty of a criminal offense.

The national organization intends to take firm action in this respect, both to protect its reputation and as a means of raising the ethical standing of the buying fraternity. The Legislative Committee of the National Association of Purchasing Agents has formulated a resolution endorsing the proposed legislation aimed to prevent commercial bribery. The Federal Trade Commission has been requested to furnish the Legislative Committee with information concerning the recipients of gratuities in all cases where concerns are cited to appear before that body for practicing commercial bribery. It has also been recommended to the Board of Directors of the National Association of Purchasing Agents that the acceptance of gratuities intended to influence business should act to prevent such recipient from being accepted or retained as a member of the National Association of Purchasing Agents.

AMERICAN SOCIETY FOR TESTING MATERIALS MEETING

At the annual meeting of the American Society for Testing Materials, to be held at the Hotel Traymore, Atlantic City, N. J., June 24-27, inclusive, special attention is to be paid to magnetic analysis, and there will be a memorial session in honor of Dr. Edgar Marburg, who was secretary-treasurer from 1902 until his death on June 27, 1918. The memorial session will be held on Tuesday evening, June 24, at which also President Guilliaum H. Clamer, Ajax Metal Co., will deliver an address on "Standardization." A Steel and Wrought Iron Session will be held on Wednesday morning and the subject of Corrosion will be included in the Magnetic Analysis Session on Wednesday evening. A session on Malleable Iron and Non-Ferrous Metal is scheduled for Thursday evening.

NOMINATION FOR OFFICERS.

The following nominations for officers are announced:

For president, J. A. Capp, chief testing laboratory, General Electric Co., Schenectady.

For vice-president, C. D. Young, superintendent motive power, Philadelphia, Baltimore & Washington Railroad, Wilmington, Del.

For members of executive committee, Ernest Ashton, H. F. Moore, C. F. W. Rys and Admiral D. W. Taylor.

The total membership reported at the last annual meeting was 2,261. The total membership on April 18 was 2,376, making a net increase of 115, as compared with an average net increase of 58 for the corresponding period for the previous five years.

PERSONALS

ITEMS OF INDIVIDUAL INTEREST

W. Hirschmann has severed his connections with the Nathan Manufacturing Company of Flushing, L. I., N. Y., and has accepted a position as superintendent with Ross & Gade, New York.

Elmer W. Woodmansee, formerly with the Ford Motor Company, of Detroit, Mich., is now connected with the Victor Corcoran Lamp Company, of Dayton, Ohio, in charge of their plating department.

Edward V. Peters has become head of the sales department of the New Jersey Zinc Company, New York, succeeding H. G. Clopper, whose resignation took effect on May 1. The new incumbent enjoys the distinction of being the youngest man to fill that position, an important one, because of the volume and wide scope of the Company's business.

S. K. Reeves, formerly with the Paul S. Reeves Company, Philadelphia, Pa., manufacturer of bearing metals, and later with the Emergency Fleet Corporation in charge of the real estate department under Rear-Admiral Bowles, has been elected secretary of the Cardinal Tube Company, 2217 Chestnut street, Philadelphia, manufacturer of rivet sets and bridge reamers.

C. G. Dickinson, formerly New York representative of White and Brothers, Philadelphia, Pa., and more recently with the United States Government in the office of the Directors of Sales, having charge of the sales of all raw materials and scrap, April 1 took charge of the metal department of F. H. Niles & Company, Inc., Woolworth building, New York.

Royal F. Clark, for the past three and a half years foreman of the gold and nickel plating departments of the Acme Shear Company, Bridgeport, Conn., the largest shear manufacturers in the world, is now general foreman of the copper and nickel plating departments of the matrix manufacturing department of the Columbia Graphophone Manufacturing Company of Bridgeport, Conn.

J. B. Mendenhall, formerly with the Great Western Smelting and Refining Company, St. Louis, Mo., and more recently sales manager of the Baltimore, Md., works of the Union Smelting and Refining Company, Newark, N. J., is now sales manager for the Lewin Metals Corporation, manufacturers and smelters of babbitts, solders, type metals, aluminum, spelter, copper ingot, red and yellow ingot, St. Louis, Mo.

John F. Neville, for many years with W. A. Tottle & Company, Inc., brush manufacturers of Baltimore, Md., and James A. McCafferty & Sons of Brooklyn, N. Y., is now connected with the Hilo Varnish Corporation, manufacturers of varnishes, enamels, japans, etc., Brooklyn, N. Y. Mr. Neville will call upon a special class of trade in New York City and vicinity. H. H. Lotz, formerly with Lowe Brothers Company, has also become associated with the sales organization of the Hilo Corporation. Mr. Lotz will make his headquarters at Dayton and will look after both the manufacturing and the jobbing trade in southern Ohio.

DEATHS

MARTIN J. O'CONNELL

Martin J. O'Connell, president Bennett-O'Connell Company, of Chicago, Ill., passed away at his residence in Wilmette, Ill., on March 21, after a very short illness. His death was due to heart failure.

MARTIN J. O'CONNELL

Mr. O'Connell's life was devoted to the platers', buffers' and polishers' supply industry. He started in when a young boy with the North Hampton Emery Wheel Company as errand boy, and he was soon advanced to the position of city salesman. His ability was soon noted, and he was again promoted to a road position, which he held from 1888 to 1895, with the North Hampton Emery Wheel Company. During his connection with this firm he formed the acquaintance of C. D. Bennett, with whom the Bennett-O'Connell Company was formed in 1896. Mr. Bennett died in October, 1918, and an obituary notice of him appeared in THE METAL INDUSTRY for November, 1918.

During his twenty-three years' connection with the Bennett-O'Connell Company Mr. O'Connell had formed the acquaintance of almost every man in the country who is in any way connected with the plating and polishing industry, and as he was so well known, it is unnecessary to go into details to exploit his splendid life. Mr. O'Connell was also vice-president of the Ayer-O'Connell Company at Meriden, Conn.

He was 54 years of age and left six children; his wife having died in January, 1916.

FRANK W. HASKELL

Frank W. Haskell, president of the Carborundum Company and its allied companies, died suddenly at Daytona, Florida, April 2. Death was due to heart failure. Mr. Haskell had been in Daytona since January and seemingly had been in the best of health. The news of his sudden demise came as a distinct shock.

FRANK W. HASKELL

Frank W. Haskell was born in Brooklyn, N. Y., December 17, 1861. In 1879 he became connected with the Chicago, St. Paul and Milwaukee Railway in a clerical capacity. In 1887 he became associated with H. C. Frick and became identified with several of the many Frick interests. He remained with Mr. Frick until 1898, when he was made vice-president of the Carborundum Company at Niagara Falls, N. Y. One year later he was made president, succeeding Dr. Edward Goodrich Acheson, who organized and became president of the Acheson Graphite Company.

Joseph McManus, a well-known electro-plater and one of the first subscribers to THE METAL INDUSTRY, died on March 27, 1919. Mr. McManus was born in Edinburgh, Scotland, forty-seven years ago, coming to this country when a young man. He was connected with the Whiting Manufacturing Company, New York, for sixteen years, and two years before his death was in charge of the plating department of the Spiro Manufacturing Company of New York.

TRADE NEWS

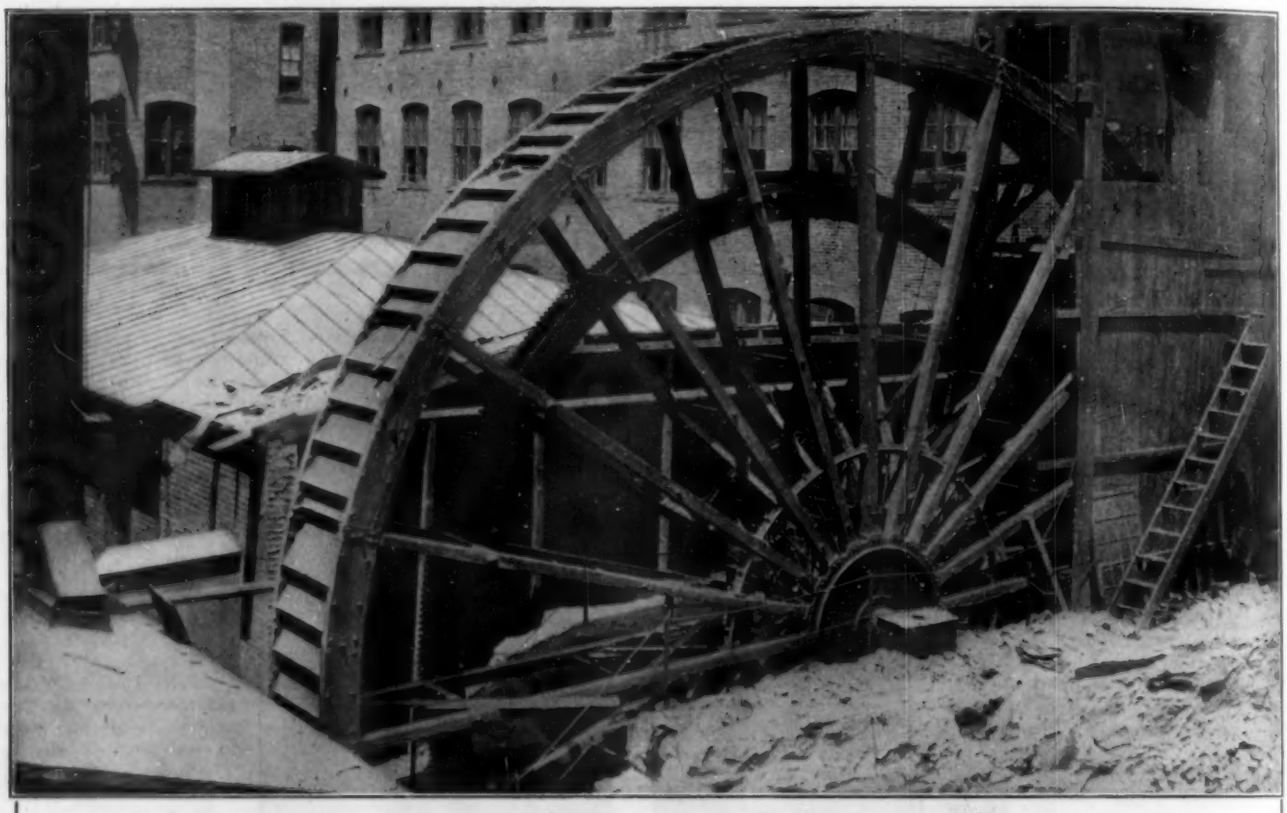
BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

WATERBURY, CONN.

MAY 12, 1919.

Considerable interest was aroused among the manufacturing interests when it was announced recently that the Connecticut Brass and Manufacturing Company, which had been declared bankrupt would be put on its feet again.

Waterbury is the leading city in the State in war time construction, according to the 28th report of the Bureau of Labor statistics for the two years ending November 30, 1918. It has spent the total sum of $4,430,900 in construction work. The American Brass Company is credited with $496,000, one building alone costing $275,000. Another building erected by the Autotyre Company cost $65,000. A total of $1,288,900 was spent by



From "In Chase Companies."

THE OLD MILL WHEEL.

The Old Water Wheel Which Was the Source of Power for the Waterbury Manufacturing Company Twenty-five Years Ago at Waterbury, Conn.

The concern was recently absolved from bankruptcy by Judge Edwin S. Thomas, of the United States District Court, which dismissed the involuntary bankruptcy petition.

It was reported at a court hearing in New Haven recently that the company had made $128,000 clear profits in the past six months, and that the liabilities of the company are about $1,200,000 with assets of $1,800,000. The concern has now started to reorganize on a basis which will make it a firm doing business at a profit equal to that cleared by other brass concerns.

The receiver's report shows that from September 5, 1918, to March 31, 1919, the following monthly shipments were made: September, 618,000 pounds; October, 583,907 pounds; November, 800,849 pounds, giving an average of 667,585 pounds monthly while operations were on a war basis.

During the so-called transition period the shipments were: December, 271,031 pounds; January, 211,676 pounds; February, 99,002 pounds; and in March on a peace basis, 283,346 pounds.

The business of the corporation consists of the production of sheet brass and copper in thin gauges.

Two men experienced in brass casting shop and rolling mill practice have been placed in charge of the plant. James C. McKay is superintendent of the West Cheshire plant. Frederick J. Wooster, now superintendent of the Waterbury plant, was with the Waterbury Brass Company for 23 years.

the Chase Companies during the two years ending with November, 1918. One group of buildings constructed by this company reached the total cost of $1,260,000. The Oakville Company spent $100,000 for buildings, while the Scovill Manufacturing Company leads all the other factories in the amount spent during the period when the war was in progress, the expenses of this company for construction work reaching the total of $1,398,350. The cost of the Scovill buildings ranged from $2,000 to $65,000, while one group cost $104,700.

It is expected that the unemployment situation in Waterbury will be greatly benefitted by the bill which recently passed the State Legislature providing for the continued maintenance of the United States Employment Bureau. Owing to the failure of Congress to provide appropriation for this office it was planned to close up on the first of May. The State will provide for the continuance of these offices until June 1 at an expense not to exceed $13,000 for each office.

Local factories are laying in their supply of coal to take advantage of the present price of $12.50 a ton, reduced a few weeks ago from $13. An increase is expected on May 1.

Methods for safe-guarding men in factories were discussed by the Safety Council recently. Dr. Nelson A. Pomeroy, chief surgeon of the Scovill Manufacturing Company talked on "Neglect of Slight Accidents in Factories." Only 22 cases of infection were recorded out of 15,897 injuries treated at the

Scovill first aid hospital in 1918. R. J. Hine, secretary and treasurer of the local safety council spoke on "Goggles and Their Use in Safeguarding the Workman." Stereopticon views were shown illustrating cases of carelessness which often lead to injury.

Many of the soldiers returning to Waterbury are not getting their jobs back. Of 800 discharged soldiers and sailors who have registered with the local United States Employment Service 145 have not been placed. The trouble does not rest with the factories, for in practically every case they are taking their old employees back. It is the men who are employed in the smaller shops and other places where there are few employees. In the case of some of the 145 men who have not obtained jobs many were offered positions and refused them.

The American Brass Company, through John P. Elton, has offered to the public of Waterbury several acres of land to be used as a people's playground under the auspices of the Waterbury Community Service Commission. Ball grounds, tennis courts and running tracks will be provided there.—D. H. P.

BRIDGEPORT, CONN.

MAY 12, 1919.

As in other parts of the country, interest for the past week and for some coming time is centered in the Victory Liberty Loan drive. This city, although running slightly below expectations at present, will undoubtedly, so the leaders of the drive assert, "go over the top" before the expiration of the time set for the drive.

Bridgeport is essentially a manufacturing city, and has located here many factories of national reputation and branches of other manufacturing concerns which take their rank among the leaders of the country's industries. One vital fact that is often left out of a financial canvass of Bridgeport is that many of the plants operated in this city are the results of investment of "outside" capital; that is, the headquarters and main business offices of many Bridgeport plants are located in other cities, with the result that contributions made by these firms are frequently credited to some other city.

Despite this fact Bridgeport depends mostly on its factories and its factory employees in any kind of a "drive" that is attempted in the city. That this faith is not unjustified has been proven in the past, and is being again demonstrated in this campaign. Among the subscriptions taken so far are many by metal goods factories in the city, a partial list of them and their subscriptions following: Bridgeport Brass Company, $200,000; Locomobile Co., $100,000; Crane Company, $100,000; American Tube and Stamping Company, $75,000; employees of the Lake Torpedo Company, $96,600; employees of the Locomobile Company, $80,000; employees of the Bullad Machine Tool Company, $6,000; Crane Company employees, $42,750, while the other branch of the Crane Company took out $7,650; Bridgeport Metal Company employees, $4,200; Singer Company employees, $4,800; Bridgeport Brass Company employees, $45,000; American Chain Company employees, $38,950; Harvey Hubbel Company employees, $2,550; Max Ams Company employees, $3,000; Bilton Machine Tool Company, $6,800.

This is not a complete list of all the factories in the city, or even of all the factories in the metal line, and neither is it a complete return of those factories already listed. Subscriptions are coming in every day even from the factories mentioned above, and many of the plants in the city have as yet made no return at all, preferring to hold their record until the closing days of the drive.

Contrary to the expectations of many the armistice has not slowed up work in the city to any appreciable extent. Most of the factories, with the exception, possibly, of only the Remington Arms, have once more steadied themselves on their industrial legs, and are now working on a regular schedule. Quite a few of the shops are running overtime shifts, and while there is at present a surplus of labor here, it is gradually being absorbed, and manufacturers predict that before winter there will be a labor shortage.

The American Graphophone Company, whose business has prospered by leaps and bounds the last few years, is planning considerable extensive work in the near future. It has recently purchased the Chatlos East End Lumber Company plant opposite their East End building, and it is proposed to erect graphophone buildings on the site of the former lumber yard. The deal takes in four acres of very valuable land, and is one of the biggest real estate transactions in the city in years. The sale price has not been made public.

The E. H. H. Smith Silver Company, which has been for some time in the hands of Receiver John T. King, appointed by the Superior Court, will in all probability be sold some time during the next week or two. An injunction prohibiting the sale was granted recently in the District Court, but error has been found in that decision, and the injunction has been withdrawn. The reason for the receivership has not yet become definitely known, and is causing some wonder in financial circles as the Silver company has been for some time past supposed to be making considerable returns on the investment. It is understood that a bid from a New York broker will finally be accepted by the receiver.—L. M. P.

NEW BRITAIN, CONN.

MAY 12, 1919.

Reflecting the general trend toward better labor conditions that are being reported around the country, New Britain manufacturing concerns are also showing material improvement, both as regards the number of men employed and the amount of orders received. While there has at no time been a serious overabundance of labor here, nevertheless today the number of men who are idle because of lack of employment is negligible. There are jobs for about all who want them.

In proof of the improved conditions, which are expected to continue to show improvement as the season advances, is the action of at least two big concerns that have increased their working schedules. The Fafnir Bearing Company, manufacturing ball bearings of all descriptions, has been compelled to disregard previous orders for an eight hour working day and now the entire plant is operating on a 10 hour system. The same thing is true at the Russell & Erwin division of the American Hardware Corporation where the working schedule was cut down to eight hours a couple of months ago only to be again restored. At other concerns business seems to be picking up and, the manufacturing leaders say, just as soon as the expected building boom around the country begins to materialize, the business here will speed onward with surprising vigor.

The New Britain Machine Company, the largest government munitions and ordnance making concern in the city during the war, is smoothly shifting from war-time to peace time products. While not all government orders have been completed, and work is still being carried on in the manufacturing of anti-aircraft guns and other army ordnance, one large section of the plant has been turned over to the manufacture and development of an important machine screw product. A new product at the factory is a heavy motor tractor which is being produced here.

At the Landers, Frary & Clark factory peace time orders for table cutlery, and other household utensils, are being received in large numbers and old orders, held up because of the war, are now being filled. This concern is building an addition to its plant in Plainville, a suburb. The Stanley Works, is handling substantial orders and the Corbin Screw Corporation, in addition to making screws of all kinds, chains and bolts, is also turning out an increased production of Corbin-Brown speedometers which are used on a number of standard cars.

The North & Judd Manufacturing Company continues to work on a 10 hour schedule and so busy is the plant that it was impossible, recently, to release its employes to attend a parade in welcome for the returned soldiers. The Stanley Rule & Level Company, where carpenters' tools of all kinds are made, is being favored with many big orders as are the Skinner Chuck Company, the Union Manufacturing Company, the Hart & Hutchinson Company, Corbin Cabinet Lock Company and the Barnes & Kobert Company—H. R. J.

TORRINGTON, CONN.

MAY 12, 1919.

During the month of April, 370 men were placed by the Torrington office of the state employment service. Forty-seven of these were ex-service men. The number of applicants who registered during the month was only 319. The difference in these figures is due to the fact that a number who registered during the latter part of March were not placed until April.

There is plenty of work for everybody in Litchfield County, according to a statement made to a representative of THE METAL INDUSTRY by R. Dunscomb Sanford, superintendent of the office. I could place 50 men on farms immediately if the men were available, said Mr. Dunscomb, and there are jobs open for 125 women throughout the county. Winsted alone needs 75 women workers. No man or woman who really wants work need be idle.

Women workers are needed at the plants of the Torrington Company and the Fitzgerald Manufacturing Company. Most of the women workers who were employed at the Coe Brass Branch of the American Brass Company during the period of the war, have been laid off but they experienced no difficulty in landing new jobs.

Bristol has been added to the territory covered by the local employment office. In Bristol there is a big demand for labor but the housing accommodations are inadequate.

The employment office will remain open until July 1. All expenses are being paid by the state.

As in every previous Liberty loan campaign, Torrington manufacturers co-operated loyally in pushing the sale of Victory loan subscriptions and they did their full share in helping Torrington to subscribe its quota of $950,000. Drives were conducted in all the shops. Part of the American Bass Company's subscription of $2,000,000 was credited to the Coe Brass Branch. The chairman for this drive was John H. Seaton, cashier of the Torrington National Bank.

The Torrington War Chest Association, of which F. L. Braman of the American Brass Company was president, and which accomplished such splendid results in raising funds for war relief work, was dissolved on May 1. In its place has been organized a Community Fund Association to raise funds for the care of the poor in Torrington. This association is patterned largely after the war chest association and the same procedure will be followed to raise the funds, each employe in Torrington being asked to contribute one per cent. of his weekly wages for a specified period. The association has the approval of the manufacturers of the town, who were active in bringing about its organization. The trustees include Charles H. Alvord, of the Hendey Machine Company; Thomas W. Bryant and F. L. Damon, of the Union Hardware Company; F. L. Braman, of the American Brass Company; W. W. Cotter, of the Turner & Seymour Company; P. J. Fitzgerald, of the Fitzgerald Manufacturing Company; Robert C. Swayze, of the Torrington Manufacturing Company; F. P. Weston, of the Torrington Company, and others prominent in manufacturing circles here.

H. B. Houghton, formerly sales manager of the Turner & Seymour Manufacturing Company, Torrington, Conn., has resigned his position with the Stamford Rolling Mills Company at Stamford. He will continue to reside at Stamford with his family until June 1, when he will go to Asbury Park, N. J., for the summer.

Captain G. Lamonte Hammann, son of George E. Hammann, secretary and treasurer of the Progressive Manufacturing Company, Torrington, Conn., has returned from overseas, where he was in service in the aviation corps for nearly 20 months. He brought back with him a French war cross awarded for gallantry in action.—J. H. T.

PROVIDENCE, R. I.

MAY 12, 1919.

Continued improvement in industrial conditions throughout Rhode Island is particularly noticeable among the metal trades and there is every indication that the coming months will show further increase in the volume of business. Recently the Rhode Island metal workers have been receiving a fair and increasing amount of orders, some concerns having plenty of business ahead to assure their running their plants at capacity for some time to come.

Speaking of conditions one manufacturer a few days ago said: "I think that we have turned the corner and the uncertainty has passed and the lack of confidence has been dissipated." In the jewelry field the situation is unequaled in the history of the industry. Orders are piling up, more buyers are visiting the city to look at goods and the shops are running full time without opportunity to secure additional help.

There has also been a very decided improvement as regards the number of unemployed and there is less criticism about returning soldiers not being able to secure positions. This improvement is only another of the numerous straws which emphasize the general improvement that has taken place in business conditions. Not only is business among the metal trades showing a healthy recuperation, but wages are considerably higher notwithstanding the increasing number of concerns that are adopting the 48-hour a week schedule, in a majority of instances without loss of pay.

The manufacturing jewelry industry of this city, as well as the Attleboros and other parts of New England, has not been so busy in a long time as at present, some concerns even being forced to refuse orders, especially when placed for delivery on a specific date. The industry is one of the few throughout the country reported as being busy beyond normal.

The peculiar feature of the situation is that the greatest demand is for the best lines of goods. This is explained by the fact that the working classes have been receiving such large wages during the war period that they are purchasing luxuries such as they have never before been able to obtain.

The middle and cheap grades of goods are also moving more freely than for a long time, because of the opening and developing of many new markets, especially in the Latin-American countries. Reports from New York show that, during the last few weeks, representatives of foreign firms have been present in larger numbers than ever before. These buyers have been from New Zealand, Dutch East Indies, South America, Mexico, England, Scotland and Holland. In consequence, many salesmen for the Providence and Attleboro concerns have been in New York to meet these buyers.

Usually during the early part of the month of May the salesmen remain at home to meet the numerous buyers who usually visit Providence and vicinity at this time to place their orders for deliveries later in the year. The advance guard of these buyers is already reported as being in the city, although in much smaller numbers than for many years past, many having stopped off in New York because of the presence there of so many of the salesmen.

With the large number of orders on their books, the manufacturers are finding several handicaps—lack of expert help and a shortage of materials of various kinds. Although the manufacturers are ready to receive their former employes upon their return from service, many of the latter are not desirous of taking positions where they will be housed up inside, but prefer outside work, especially during the summer months.

During the last few weeks and at the present time, factories which produce lines for men's wear have been exceptionally busy, especially on tie clasps, soft cuff and collar bars and links, scarf pins and watch fobs and chains. This is attributed to the number of former soldiers and sailors who are again wearing civilian clothes.

The Westerly Welding and Machine Company is the name of a new concern that has started in business on Granite street, Westerly, and will carry on a general machinists' and welding business.

The Architectural Bronze & Iron Company, 25 Day street, is conducted by Charles A. Komiske, Frank L. Kneupfer and Joseph F. Farrell, according to their statement filed at the city clerk's office.

Employes of the Bugbee & Niles Company, manufacturing jewelers, of North Attleboro, were surprised recently upon opening their pay envelopes to find in addition to their regular weekly pay a sum amounting to 10 per cent of the

wages earned by them last year. The firm made no announcement of its intention to distribute a dividend.—W. H. N.

ROCHESTER, N. Y.

MAY 12, 1919.

Despite the fact that business conditions among the manufacturing institutions of this city are all that could be asked for, with plenty of orders and increasing demands from week to week, a drawback has presented itself in the shape of impaired railroad service. Shipments are slow, both into the city and out, and that fact is greatly interfering with the general output.

Every plant of any importance in Rochester is rapidly adjusting itself to pre-war conditions and giving employment to additional help almost from day to day. Materials with which to manufacture, particularly the metals, are in plenty and prices are becoming more and more attractive as the time goes by.

Aluminum appears to be the only metal that is really short on delivery, owing to the fact that the tremendous expansion of the automobile industry has incurred heavy demands on the light metal. Aluminum can be obtained but not in satisfactory lots, from the fact that the auto industry is requiring about two-thirds of the total output of the country.

The molders strike here is bound to interrupt work in a number of institutions, particularly where brass and copper are used in large quantities. Moulders in these metals are employed in the stamping works and in the Gleason plant. It is believed the trouble can be abridged.

The Eastman Company is about to erect another big structure at Hanford's Landing on the Genesee River. The building will be five stories in height and cost $350,000. It has not been announced to what use the new structure will be put.

On the whole manufacturers were pleased at the passing of May day without any further labor disturbances. Indications are that a prosperous summer season is at hand, despite the general uncertainty that always follows the close of a great war.—G. B. E.

MONTREAL, CANADA

MAY 12, 1919.

Under no circumstances does uncertainty conduce to healthy expansion in production or in trade in the metal lines in this city. Until the terms of peace are finally settled and have been accepted by the enemy countries it will continue to exist, and will necessitate caution in the conduct of business. Even after the belligerent nations know and understand the terms on which peace is to be based a further readjustment will be certain to intervene, especially so far as foreign trade is concerned, and it may take some time for business to settle down.

Productive activity and manufacturers will not proceed confidently until the regulations and restrictions adopted as war measures are removed. Relatively speaking, however, business conditions in Montreal are such as to justify hopefulness.

The Robert Mitchell Company, Ltd., has been awarded the contract this week for supplying the brass electric fixtures for one hundred and fifty houses in course of erection at Halifax, N. B.

The Thomas Davidson Manufacturing Company, 187 Delisle street, has been making some alterations in their tinning plant. They make a specialty of re-tinning dairy and cheese factory utensils, castings, etc., by the hot process.

The manufacturing jewelry business is the only line that is fully employed at present. Farner Brothers, St. Lawrence Boulevard and Craig street, also Birks Brothers, Philips Square, are running to their full capacity.

Stabilization of building construction costs owing to the reduction in steel prices this month is expected to boom construction work which has been at a very low ebb. Building has been held up pending the adjustment of prices, and an early return to activity should mean plenty of work for all associated lines. Recommended price cuts in other lines besides that of steel are not anticipated, although the dealers in lumber, brick, cement, plumbing and steam goods are co-operating with the builders in every possible way to maintain estimated costs as their level.—P. W. B.

COLUMBUS, OHIO

MAY 12, 1919.

Little change was made in the metal market in central Ohio territory during the past month. Reserve stocks in the hands of metal using concerns are still fairly large, and consequently there is little demand. There is no disposition to buy for the future, because of the uncertainty as to prices. On the whole it is a hand-to-mouth market, and little is expected until the trade is stabilized.

The strongest point in the market is the demand for type metals, which show a good movement. Printers and engravers are buying fairly well, and the same is true of electrotypers. Other lines of metals are fairly slow. Copper and brass are not in good demand, and the same is true of aluminum. Zinc and tin are moving slightly better than was the case a month ago. Prices are changeable and move from day to day.

Metal-using concerns are slow in getting back to full production. The process of readjustment is apparently retarded by the delay in signing peace. Then again the adjustment of government contracts is coming along slowly, and manufacturers are not inclined to go ahead until their war contracts are adjusted.

The Akron Bronze and Aluminum Company has been chartered with a capital of $50,000 by Henry Elmann, Alfred Herberich, Edmund Burroughs, E. V. Smith and Elsie Maag.

The authorized capital of the Rex Brass Company, of Cleveland, has been increased from $1,000 to $10,000.

The Ideal Copper Company, of Warren, Ohio, has been chartered with a capital of $25,000 by Harlow M. Stafford, James A. Reeves, George T. Fillius, Edna B. Stafford and Jennie C. Reeves.

The Metal Ingot and Alloys Company, of Cleveland, has been incorporated with a capital of $20,000 by H. B. Howells, Harry C. Gahn, Isador Grossman, S. Broth and H. M. Shorp.—J. W. L.

CLEVELAND, OHIO

MAY 12, 1919.

Beginning of May finds the eyes of the entire metal industry centered upon two points—the building situation and the position of labor for the immediate future. Upon the attitude of the one will depend the success for the other. The metal industry of this section, as a whole, is receiving its full share of the automobile work which has been developing since the armistice was signed. The settlement of peace conditions abroad, now almost an assured fact, is expected to assist business conditions generally as well. But still a large outlet for the product of the metal industry enters into building construction as well, and unless a real building development is started at once, it is feared the entire year will pass without a substantial amount of business having come forward.

It is to avoid just such a condition, and to bring the building situation back to normal at once, that a meeting of every branch of the building industries will be held in Cleveland some time during the coming month. The meeting will be held under the auspices of the National Federation of Construction Industries, of which E. T. Trigg, Philadelphia, is president. According to Mr. Trigg, who was in Cleveland the other day, the purpose of this conference will be to cement relations among all the different branches of the construction field. It is estimated that at least forty different branches of industry will be represented. This will include representatives in every line, from the manufacturer of any material entering into building construction, to the labor that puts it together. Each faction will be expected to hold an individual meeting, work out plans for co-operating, and submit these plans to the main meeting at which all factions will be represented, and thereby create a harmonious program for immediate improvement of the building situation.

Meanwhile local metal industry establishments are going ahead with individual programs designed to augment business activities in these various lines. Among the most important developments originating in Cleveland is the announcement that a new factory now being built at Flint, Mich., will be acquired by the Standard Parts Company of this city, for the construction of certain parts for automobiles. The new factory will take the place of the present one, and will have a capacity four times the size of the old one. A feature of construction of the new plant is that all operations are consecutive, from the unloading of raw material from the railroad track, to the placing of the finished product on the same track at the other end of the plant.

Another important change announcement emanating from Cleveland is the announcement of the disposal of the Manitowoc, Wis., factory of the Alumium Castings Company to a local concern. The deal was made a year ago, but only made public this week. The explanation by local officials of the Aluminum Castings Company is that the extreme demands upon the firm for speedy delivery of motor parts for the Liberty motor no longer exist, and that the Cleveland, Detroit and other plants are sufficient to care for the demands along this line.

Plans for further expansion are announced this week at the Ferry Cap and Set Screw Company, in the construction of a three-story addition to its present building in the Flats, at a cost of $60,000. The structure will occupy a plot 48 by 170 feet and is expected to be completed by July 15.

Several persons were injured and many others had narrow escapes from death when fire started in the plant of the United States Metal Products Company, in the uptown section of the East Side. The fire originated in the factory part of the building, and spread rapidly to the offices. The cause of the fire has not yet been ascertained. The loss is estimated by General Manager Abraham Bloch at $60,000. C. C. C.

CINCINNATI, OHIO

MAY 12, 1919.

Business in the metal trades generally in Cincinnati has been only fair during the past month. Demand has been light and inquiries comparatively few, this condition undoubtedly being due to the uncertainty existing, in regard to the immediate future, prevailing in nearly all lines of industry. The efforts being made by business men to restore confidence and accelerate the work of reconstruction so far have met with indifferent success, and the men engaged in the metal trades do not expect matters to improve to any great extent until the existing doubts are removed, and the natural demand, which they are sure will be evidenced when peace is signed, has a chance to develop. Building operations and plant improvements are practically at a standstill, all these conditions adversely affecting the metal trades. One of the prominent machine tool men of Cincinnati said: "The orders received at present represent only the demand for material absolutely needed to replace old tools and machinery, with a slight demand from foreign buyers. We do not expect much improvement until the terms of peace are announced, and the export trade can be reasonably sure of sufficient bottoms to carry the goods that are bound to be needed for reconstruction work. When that time comes we may look for a boom in business which will overshadow anything ever known in the past. Until then the only thing to do is to hold fast, work hard and hope for the best.—H. C. L.

DETROIT, MICH.

MAY 12, 1919.

Conditions in the brass, copper and aluminum fields here show a most decided change for the better. This is all due, however, to the great revival of business among the automobile companies here. Announcement has been made that the General Motors Corporation, which owns a number of the big automobile plants, has started to spend $12,000,000 on new buildings and equipment in Detroit, and will employ a great number of additional men. Among the improvements will be a ten-story administration building on the Boulevard, near Third avenue, besides a new plant for the Cadillac Motor Car Company. All of the corporation's plants in the city and the nearby towns are working to capacity.

Another announcement of interest is that of the amalgamation of the Maxwell Motor Car Company with the old Chalmers Motor Car Company. This is no surprise, as the Maxwell interests have been operating the Chalmers plant for the last year. It means, however, some great improvements which have not yet been made public.

The Ford, the Paige, the Packard, the Hudson and the Studebaker companies are reported employing more men now than at any time before the war. It was officially announced within the week that a labor shortage was imminent, and that at present there are more jobs open than can be filled. Both skilled and unskilled labor are now invited to come here from any point they choose, and are assured they will be given employment. Every demobilized soldier has been placed in a comfortable position, and there is plenty of room for others.

Wages for both skilled and unskilled labor is high, and there is no prospect that there will be a decline for a long time to come.

The greatest drawback to labor at present is the lack of housing conditions. Never in the history of Detroit has it been so difficult to obtain places in which to live. Rents have gone sky high. An apartment that rented for $35 a month six months ago has been advanced to $60, and people are glad to take them at that. There is absolutely nothing to rent at the present time, and but little building is under way, owing to the high cost of materials and labor. This means that a great tented city will spring up about Detroit within the next few weeks, and already plans are under way by many families to seek the open fields.

METAL LAWSUIT.

One of the most interesting and at the same time the hardest cases ever tried in court here, owing to the technical nature of the evidence, was settled in the United States District Court, April 28, 1919. The case was a law suit started November 20, 1915, with the Chicago Screw Company, Chicago, Ill., as plaintiff and the Michigan Copper and Brass Company, of this city, defendant. The records show that about November 27, 1914, the plaintiff company gave an order to the defendant for 1,350,000 pounds of copper rod of the composition of 90 per cent. copper, 9 per cent. zinc and 1 per cent. lead, to be delivered in shipments of 150,000 pounds a month. According to the complaint filed in court the defendant company for some reason or other failed to fill the order to the satisfaction of the plaintiff and in consequence action was brought for damages. The trial just closed started on April 8 and was concluded on the 28th, when Judge Killits, who heard the case, directed a verdict of $99,426.97 in favor of the Chicago Screw Company, the plaintiff. It appears likely that the case will be appealed, but at the present writing no papers have been filed to that effect.—F. J. H.

LOUISVILLE, KY.

MAY 12, 1919.

Evidence that the Moran Flexible Steam Joint Company has had a good year was shown when it subscribed $10,000 for the Fifth Liberty Loan. The Belknap Hardware & Manufacturing Company, large jobbers of finished copper and brass lines, was the largest local subscriber with $500,000.

E. E. Sherman, of the Vendome Copper & Brass Works, has been busy right through the season. Although Government orders have not been plentiful for some months past, there were a number of shipbuilding concerns which held unfinished orders which are being filled. The concern also had a lot of large copper tanks for the Government, and has been completing this work.

Tom Hines, of Hines & Ritchey, reports that the concern is managing to keep very busy on milk machinery, but that other lines are not showing any special activity at the present time.

J. W. Rademaker, of the Independent Brass Works, has been busy for several months in completing some subcontracts on war contracts, mostly held by local concerns, and feels that things will continue good for three or four months at least.

The plant of the C. Lee Cook Manufacturing Company is operating night and day, on full shifts, and will be busy for several weeks yet in completing war orders.

Matt Corcoran, Jr., of Matt Corcoran & Company, is rather undecided as to the future of the brewery business, as the brewers themselves don't seem to know. However, he believes that there is a chance of a fair demand for brewery work in event of small percentage alcohol beer being made after prohibition settles. The company at present is busy on old contracts, which will hold for some time.

The labor situation has not changed at all. Common labor is drawing a minimum of $3 a day, and skilled moulders seventy-five cents an hour. Machinists are drawing from sixty-eight cents up. Good men are scarce and hard to find. Louisville is reported as one of six cities that show a labor shortage. General business has been good, manufacturers are busy, property is fully rented, plants are at a premium, and bank clearings are showing steady gains. Available manufacturing plants have become so limited that the Louisville Industrial Foundation is discussing plans for a large factory loft building to cost close to $1,000,000 to house new industries.

The cost of materials is down somewhat, and the market has been generally weak on scrap stuff. On a base price basis brass tubes are quoted at around 32 cents; sheet, 23@24c.; ingot, 16 cents. Heavy scrap brass is quoted at 10@11c.; copper, 15c.; and lead at 6@6½c.

The standard Sanitary Manufacturing Company, Louisville, has recently installed an electric furnace in its plant here, and is making an excellent showing with the new method of heating metal. The company has recently installed a large cafeteria for its employees, several hundred in number, and is serving noonday meals on the dairy lunch plan at cost.

J. W. Oliver, formerly sales manager and more recently general manager of the Louisville division of the Standard Sanitary Manufacturing Company, known as the Ahrens & Ott department, has been elected a director and secretary-treasurer of the parent company at Pittsburgh. The company is discussing plans for making Louisville its headquarters, with main offices here. S. H. Moon, formerly general manager of the company, recently became vice-president of the main company, and Theodore Ahrens, president of the concern, is also a Louisville man. During the war the company transferred its brass goods department to the Louisville manufacturing plant due to needing the Pittsburgh plant for shell making.

Manufacturers of brass rods, railings, office fixtures, etc., believe that some good business is in sight in Louisville in connection with plans for several new banking offices, and enlargements of office buildings. The building outlook in Louisville and the state is unusually bright. There is also a good demand developing for plumbing supplies.—O. V. N. S.

TRENTON, N. J.

May 12, 1919.

Favorable results from the wartime employment of women in the metal trades have been shwon by the different manufacturers. The work done by the women embraced a great variety of processes, from the operation of ordinary drill presses and lathes to coremaking, inspecting and assembling mechanical parts, and many precise machine operations. In the main, however, their work has been confined to the lighter processes on which rapidity and dexterity are more important than technical skill acquired by long training. It was shown that the output of the women was equal to and sometimes greater than that of the men. In the making of ammunition the women operatives on drill presses and milling machines performed more rapid work than men. Some of the manufacturers found that the women spoiled less work than the male help and believe that technical training would make women the equal of men in metal work. The women were paid less in wages because of their lower efficiency while learning and the additional expense required for special equipment and more supervision and the extra help required for heavy lifting. Few plants recruit women workers from industrial schools. Most of them are trained in the factory, where they find the active co-operation of a competent foreman is of great help. The women were regular in reporting for work and there was no great laying off on Mondays as is the case with men in many of the plants. In other words the employment of women in the metal trades is practicable.

That the cessation of the great world war has not affected the manufacture of watches is shown in the fact that the Ingersoll-Trenton Watch Company is now instructing young men in the art. In order that the company be assured of a sufficient number of people to continue the present enormous output of the plant a school of instruction in the making of watches has been opened by the company in the old Brian homestead, a short distance from the works. The property was leased from the city commission and at present there are fifty apprentices at the school of instruction. As soon as they show proficiency in the art of watchmaking they will be installed in the main plant. Formerly learners were given instruction in the main factory, but in order to properly care for the greatly increasing number of orders being received by the company, it was found necessary to open a school of instruction under a separate roof.

Enough work to keep the plant of the American Standard Metal Products Corporation at Paulsboro, N. J., busy for at least another month is assured by the renewing of a contract, suspended some time ago, for the completion of fuses for the French Government. The contract will provide work for about fifty men and women. The company feels greatly encouraged over the renewal of the contract, which calls for a large sum of money.

Business is beginning to show a decline in some of the Trenton metal industry plants and some of the factories have already reduced the number of working hours. The Jordan L. Mott Company had cut down on the working hours after the plant had been run at full time for the past four years. During the war the company had a big force at work and the employes earned big wages aside from the overtime they could put in daily. The reduction in the working hours has also resulted in a cut in the wages, but the employes will have to content themselves with conditions until business picks up. The lack of building at the present time is injuring the metal business and will continue to remain so until manufacturers and contractors begin the erection of buildings. Now that it has been decided that there is no liklihood of the prices of material being reduced it is believed that there will be a revival in the building line. The John A. Roebling's Sons Company has also cut down the working hours at the Roebling, N. J., plant.

Metal Reduction Company, of Newark, N. J., has been incorporated at Trenton with $10,000 capital stock, to smelt, refine and otherwise treat minerals, ore and metals. The incorporators are W. Russell Porter, Charles A. Howard and E. W. Stephenson.

Sergeant Robert T. Bowman, son of Robert K. Bowman, an official of the J. L. Mott Company, has received an honorable discharge from the army. He left college a year ago to join the colors and enlisted in the Quartermaster Corps at Camp Dix. Later he was transferred to the conservation and reclamation detachment and was advanced to first sergeant.

Leo T. Wallen Company, of 868 Bergen avenue, Newark, N. J., has been incorporated with $100,000 capital to take over metal specialties manufacturing business of Leo T. Wallen. The incorporators are Leo T. Wallen, Harry Hanflein and Fred T. Wallen, all of Newark.

American Iron Works Company, Inc., of Camden, N. J., has been incorporated with $50,000 capital to deal in brass and other metal goods. The incorporators are Herman Odlen and Clara Odlen, of Audubon, and John B. Kates, of Collingswood.

A number of the Trenton metal manufacturers have subscribed heavily for stock in the proposed $1,000,000 hotel for Trenton. The John A. Roebling's Sons Company subscribed $50,000, The Jonathan Bartley Crucible Company, $5,000; Co-operative Safeguarding Company, $400; Skillman Hardware Manufacturing Company, $300.

The National Metal Stamping & Manufacturing Company, Newark, N. J., has leased its three-story building at 448 Mulberry street to the Specialty Products Company. The property has an area of 15,000 square feet. C. A. L.

VERIFIED NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Bristol Brass Company, Bristol, Conn., has declared its regular quarterly dividend of 2½ per cent.

The U. S. Electro Galvanizing Company, 32 Stockton street, Brooklyn, N. Y., has leased a four-story factory at 36 Stockton street, 40x60 feet, for a new works.

The Hill Pump Valve Company, manufacturers of metal specialties, Chicago, Ill., will erect a one-story plant at Belmont avenue and Knox street, to cost about $100,000.

The American Metal Bed Company, 42 Clifton avenue, Newark, N. J., is building a one-story addition, 125x200 feet, to its plant. The new addition will cost approximately $60,000.

A branch office and warehouse of the **Ohio Bronze Powder Company** and the **Premier Bronze Powder Company,** Cleveland, Ohio, has been opened at 487 Broadway, New York, under the management of Max Siegel.

The Hausfeld Company, Harrison, Ohio, is erecting buildings doubling the present capacity of its foundry, which is operated in connection with the manufacture of the Hausfeld melting furnaces, ladle heaters and other foundry equipment.

The Sterling Aluminum Company, Erie, Pa., is contemplating the erection of a two-story building, 40x160 feet, which will be used mainly for shipping, storage and office purposes. The building will cost approximately $30,000.

The Hachmeister-Lind Chemical Company, 2332 Forbes street, Pittsburgh, Pa., has established a gold and silver smelting and refining plant at Pittsburgh and are producing gold and silver anodes, etc. They are in the market for scrap, sweeps and drosses.

The Joseph Dixon Crucible Company, manufacturers of crucibles and graphite products, Jersey City, N. J., has announced the removal of its Philadelphia sales office from 1020 Arch street to Rooms 801 and 802, Finance building, South Penn Square, Philadelphia, Pa.

The Canada Metal Company, Ltd., Toronto, Canada, through W. G. Harris, announce that at present the company is not going ahead with the building of a rolling mill to make sheet lead and facilities for making lead pipe; also a brass foundry at Halifax, N. S., as was recently reported.

The Bridgeport Metal Goods Manufacturing Company, Bridgeport, Conn., has increased its capital from $200,000 to $600,000. The company operates a tool and grinding room, spinning, stamping, tinning, brazing, soldering, galvanizing, plating, polishing, japanning and lacquering departments.

The Bronzo Alumina Corporation has moved its plant from Tonawanda, N. Y., to Bailey avenue, Buffalo, N. Y. The new plant will include, in addition to the die casting department, an up-to-date foundry which will be fully equipped for sand moulding in brass and aluminum. The company also will operate a brass machine shop and tool and grinding room.

The Pierce Plating Corporation, New York, has acquired from the K. D. Carburetor Company, 8,000 square feet of floor space in a factory at Marquette and Hamilton avenues, Cleveland. The company will equip it for nickel plating and will have offices in Cleveland. J. N. Pierce is president and E. Ekedahl, secretary and treasurer.

The American Aluminum Ware Company, 374-380 Jelliff avenue, Newark, N. J., has had plans prepared for a four story addition to its present plant and will also install new and up-to-date machinery. The company manufactures aluminum goods and metal specialties and operates a tool room, spinning, stamping and polishing departments.

The Lowenthal Company, manufacturers of ingot metals, Chicago, Ill., announce that they have adopted the trade name of Lion Brand for their brass ingots as well as for their aluminum ingots, which they state are produced under laboratory control to insure strict uniformity. The concern is also making expansions to facilitate the production for the increasing demand for their products.

The Charles Bohn Foundry Company, 738 Hart avenue, Detroit, Mich., is building a new one-story foundry, 168 x 240 feet, at Chene street and Finley avenue. The new foundry will be equipped for the production of brass, bronze and aluminum castings. The company also operates a smelting and refining department, brass machine shop and casting shop.

The Capital City Plating Works, North Pearl and Tivoli streets, Albany, N. Y., has had plans made for a one-story brick building with a floor space of 640 feet which they expect to erect just as soon as conditions permit. The company will also install new plating equipment. Galvanizing, plating, polishing and lacquering departments are operated by this company.

Plans are being completed for additional plants for the **Aluminum Goods Manufacturing Company** of Manitowoc and Two Rivers, Wis. The improvements include a five-story, reinforced building, 160x280 feet, at Manitowoc, and three structures at Two Rivers, a three-story factory, 50x320 feet; a four-story plant, 60x300 feet, and a three-story building, 44x137 feet.

Owing to increased business, the **Eager Electric Company,** manufacturers of plating generators, buffing lathes and grinders, etc., Watertown, N. Y., has had to move from its former one-story building and has purchased a new four-story building, giving about five times the floor space previously occupied. The old property has been purchased by the Watertown Bag Machine Company.

The Ferrell Brass Foundry, 110-112 East Seventeenth street, Los Angeles, Cal., has been organized to manufacture brass and bronze castings. Charles G. Ferrell heads the company and he reports that at present they are only operating a brass, bronze and aluminum foundry but expects to expand and therefore they are interested in modern methods and machinery required for polishing, plating, japanning and lacquering.

The New Standard Hardware Works of Mount Joy, Pa., manufacturers of the New Standard Unit System and Process for the hot tinning and re-tinning of all kinds of metals, has closed another contract for a No. 2 Unit, which will be installed at Massey-Harris Company Works at Toronto, Ont., Canada. This No. 2 Unit will be installed in the cream separator department, and will be used for the purpose of hot tinning steel stampings for cream separators.

The recently organized **Alloy Metal Wire Company, Inc.,** has leased the two-story factory building at 10 and 12 Woodworth avenue, Yonkers, N. Y., for a term of years for the manufacture of electrical resistance wire, pure nickel, Monel metal, spark plug wire, bronze, brass and copper. S. A. Murray, its president and general mill manager, was, until recently, engaged as wire mill superintendent for the Electrical Alloy Company, Morristown, N. J., and prior to that time was employed in a like capacity for the Driver-Harris Company, Harrison, N. J.

The stockholders of the **Joseph Dixon Crucible Company,** Jersey City, N. J., held their annual meeting on April 21, at which time the following directors and officers were elected: George T. Smith, president; George E. Long, vice-president;

J. H. Schermerhorn, vice-president; Harry Dailey, secretary; William Koester, treasurer, and Albert Norris, assistant secretary and assistant treasurer. The directors for the ensuing years are George T. Smith, George E. Long, William G. Bumsted, Edward L. Young, J. H. Schermerhorn, Harry Dailey, and Robert E. Jennings.

The Mueller Metals Company, Port Huron, Mich., by R. S. Thrift announce that while they now have 350 employees working on domestic lines it is their idea to expand rapidly just as soon as their adjustments with the United States Government on war contracts have been consummated. They started some months ago to switch the plant over to the following lines, for which they are fully equipped: Mueller "Red Tip" brass rod, brass and copper tubing, forgings, brass and aluminum die castings, brass and aluminum sand castings, brass, bronze and aluminum screw machine products.

E. M. Stephenson is now New England sales manager of the Celluloid Zapon Company, New York, with an office at New Haven, Conn. For twelve years, Mr. Stephenson has given an exceptional service to this company as a salesman in the New England field and this promotion will enable him to serve a wider field in the way that has brought him such an endorsement. B. O. Clausen, formerly chief engineer of the American Propeller Company, Baltimore, Md., and C. G. Piske, formerly with Tiffany & Company, Forest Hill, N. J., have joined the sales force of the Celluloid Zapon Company.

E. G. and L. R. Barrett have taken over the plant of the **Owl Metal Company, Ltd.,** Winnipeg, and propose to operate it on a much larger scale than heretofore, and have commenced the erection of an addition to the plant. The company will recover metals from scrap and metal by-products, converting brass and bronze filings, turnings and borings into ingots after refining. The white metal department for the manufacture of solder and machine type metals is also being extended. It has also made arrangements to turn out copper, red brass, yellow brass and bronze in ingots suitable for machine shops. J. J. Broadhurst is secretary-treasurer and manager.

The Neptune Meter Company of New York has acquired a building from the Russell Motor Car Company of Toronto, Canada, in which they intend to manufacture the Trident water meters for Canadian trade. The president of the Canadian company is J. H. Ballantine, and the managing director is William H. Randall, formerly superintendent of the Maintenance and Distribution Department of the Toronto Water Works. The new firm is to be known as the Neptune Meter Company, Limited, and it will operate a brass and bronze foundry, brass machine shop, tool and grinding room, casting shop, stamping, plating and lacquering departments.

The Wheeler Condenser & Engineering Company, Carteret, N. J., in the month of April manufactured and shipped 879,900 pounds of seamless drawn brass and copper condenser tubes. Their Crescent Brand tubing is in great demand because of its excellent corrosion resisting properties. Users find that it pays to use the highest quality of tubing in condensers, heaters, evaporators, reboilers, etc. These manufacturers are peculiarly well fitted for making tubing of this kind because of their broad experience in the manufacture of condensers and condensing equipment. Where desired, the research department of this company investigates each user's individual problems.

"The Electric Furnace Construction Company, Finance Building, Philadelphia, Pa., reports the successful starting up of a special 'Greaves-Ethells' type of electric furnace for the manufacture of corundum at the works of the Wm. McGregor Co., Airdrie, Pa. The material used for the charge is the waste dust accumulated from the crushing of natural corundum. This was practically useless and was generally considered to be a waste product. A charge of 7 tons of this material was treated in approximately 8 hours. The total energy consumption was 3,850 units, and the usable corundum ingots weighed nearly 4 tons. Results of the tests made gave great satisfaction and promise a new field for the electric furnace. We understand that fairly constant load was obtained throughout the whole of the operation."

The Bureau of Standards has sent to the printer technologic paper No. 109 on "Conservation of Tin in Bearing Metals, Bronzes and Solders." The authors are Dr. G. K. Burgess and R. W. Woodward This paper gives practical suggestions for the conservation of tin in bearing metals, bronzes, and solders; much of the data having been obtained from questionnaires sent to representative manufacturers and users of the above-named alloys. Tables are given showing the chemical composition and physical properties of many of the suggested alloys and also for service tests of genuine Babbitt and a high lead bearing metal. Tentative recommendations for standard grades of bearing metal are also included. Proper solders for various industrial uses are recommended and a new solder consisting of a preponderance of lead with small amounts of tin and cadmium is desired.

In attempting to dispose of surplus property in possession of the War Department the policy of the Government is such that no industry need feel any apprehension concerning the possibility of material being dumped on the market. The Director of Sales intends to ask the Headquarters Office of the Associated Business Papers to designate the publishers who should be called in conference where a conference is held with any industry. The above attitude of the Government was largely influenced by the exchange of views had with the Director of Sales of the Surplus Property Division and a committee of the Associated Business Papers which recently visited Washington. From now on it will be the policy of the Director of Sales to give out for publication as rapidly as possible exact information concerning the surplus property on hand and the plans which have been made for its disposition. These news items will be distributed from the office of Thomas R. Elcock, Jr., Chief of the Sales Promotion Section, Munitions Building, Washington, D. C., to whom all inquiries should be addressed.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

To manufacture die castings, molds and machines for making die castings. The Pressure Products Company, Silver Creek, N. Y. Capital $20,000. Incorporators, Theodore Stewart, J. W. Slack, M. I. Slack, A. M. Stewart, August Illfield.

To manufacture metal products for the automobile and tractor trades—The Holan Metal Products Company, Cleveland, Ohio. Capital $50,000. Incorporators: James Holan, president; Joseph C. Kovar, secretary and treasurer; P. V. Kalina, vice-president, and William Hacker, manager. The company has had plans prepared for a one-story 60x60-foot factory, which it is estimated will cost $5,000.

BUSINESS TROUBLES

The real estate and personal property belonging to the **Philadelphia Brass Company** of East Downington, Pa., was sold under the direction of Philip F. Stoever, the Trustee, on April 24. The real estate comprised nearly seventeen acres of land along the Pennsylvania railroad, with stone foundry buildings, railroad sidings, etc., and the personal property consisted of the machinery, etc., of a completely equipped brass rod mill and foundry.

REMOVALS

The Metal Export Company of America and the **Queen Brass and Copper Company, Inc.,** have removed from 59 Pearl street to 220 Fifth avenue, New York.

The Egyptian Lacquer Manufacturnig Company, makers of lacquers and enamels, has moved its offices from 124 Front street to 23 Liberty street, New York.

The Wolf Safety Lamp Company of America, Inc., manufacturers of lamps and light stampings in the various metals, has moved its plant from 74-80 Washington street, New York to 227 Grand avenue, Brooklyn, N. Y.

FOREIGN TRADE OPPORTUNITIES

For addresses of these inquiries apply to Bureau of Foreign and Domestic Commerce, Washington, D. C., and give file numbers.

29117.—A firm of machinery dealers in Sweden desires to purchase and secure agencies for the sale of machinery, tools, metals, rosin, crucibles, felt, wire cloth, belting, etc. They are especially interested in purchasing machinery and utensils for the wood pulp and paper industry.

29153.—A firm in this country with a branch in Italy, and also proposing to open offices in other European countries, desires to secure agencies for the sale of electrical railway equipment, metal goods, and other electrical supplies, and especially insulated wires, cables, rubber goods, and all the machinery and materials for their manufacture.

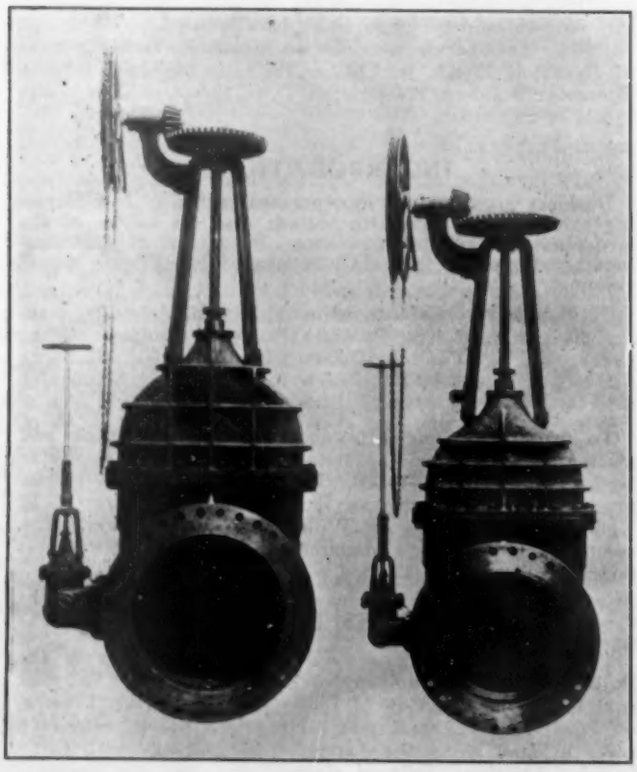
29161—A man in Norway wishes to purchase and secure an agency for the sale of metals, hardware, machinery, cutlery, enameled ware, aluminum goods, bicycle supplies. Payment cash against documents. Reference.

29168.—A firm in Norway desires to purchase and secure an agency for the sale of machinery, plated ware, knives, forks, spoons, etc., lamps, lanterns, automobiles and supplies, metals, hardware, machinery, hardware specialties. Terms, cash against documents in New York or at destination. Reference.

29190.—A man in Switzerland wishes to purchase or secure an agency for raw metals, copper, spelter, nickel, tools, shears and scissors, knives, etc., automobile accessories. All products to be purchased in large quantities. References.

29191.—The proprietor of a firm in Norway wishes to purchase and secure an agency for the sale of plumbing, steam fitting supplies, asbestos, and magnesia products, metals, heavy hardware, machinery, and electrical apparatus and supplies. Payment to be made through a New York bank. References.

29201—A company in Switzerland desires to purchase and secure an agency for the sale of all kinds of metal products. Correspondence should be in French. References.



The accompanying picture is from a photograph of two all-brass outside screw and yoke chain wheel geared operated gate valves—36-inch and 30-inch, respectively—manufactured at the Bridgeport Division of Crane Co.

The order for these valves was received by the New York Branch of Crane Co., and the valves are to be installed at the Empresa Desaquedor de Morococha Pumping Station by the Corro De Pasco Copper Corporation, in Peru.

PRINTED MATTER

Brass Goods—The F. J. Klenck Company, makers of brass goods, San Francisco, Cal., has issued an art calendar for the month of May in the interest of their metal products.

Wire Mill Equipment for brass, copper and bronze. The Morgan Construction Company, Worcester, Mass., describe in a handsomely printed bulletin all their wire mill equipment, which includes drawing frames, muffle and pot annealers, cleaning cranes, cleaning vats, galvanizing equipment, mill trucks, pointers, reels, die reaming lathes and so forth.

Electric Furnaces—The Electric Furnace Company, of Alliance, Ohio, has issued Booklet 5-B, devoted to Bailey electric furnaces for melting metals. Some very interesting information is given in this booklet in the form of test runs made on these furnaces at various foundry plants. The metals and the mixtures tested run from yellow brass through manganese and phosphor bronze to zinc cathodes. Copies of the booklet may be had upon request.

Heating Furnaces—A new bulletin, No. 41, has been issued by the W. S. Rockwell Company, furnace engineers and contractors, New York, descriptive of heating furnaces for metal billets, wire bars and cakes. The text and illustrations of this bulletin aim to give the reader a thorough and comprehensive account of the heating operations involved and include suggestions as to the types of furnaces best suited for the various plant and manufacturers' requirements. Copies of the bulletin will be sent upon request.

Platers' Supplies—The Crown Rheostat and Supply Company, Chicago, Ill., has issued a very comprehensive catalog and price list, No. 10. This catalog is well printed on heavy coated paper and contains 190 pages including index. Everything that is required by a plating department is described and illustrated in the catalog. Among the items that might be mentioned as being in classes by themselves are the following: Plating and polishing supplies, dynamos, rheostats, platers' chemicals, polishing and buffing lathes, buffing compositions, polishing material and mechanical plating outfits.

Temperature Instruments—The Taylor Instrument Companies, Rochester, N. Y., has issued a general industrial catalog of Tycos instruments containing 422 pages of useful and interesting temperature information. This new publication describes the whole line of Tycos instruments for the indicating, recording and control of temperature. Many special applications are illustrated, showing the manner in which Tycos instruments can be adapted to diverse temperature needs. Practically every instrument manufactured by the Taylor Instrument Companies for industrial purposes is illustrated and much explanatory matter descriptive of their construction and principles of operation is given.

Finished Brass Castings—The Doehler Die Casting Company, Brooklyn, N. Y., has issued a handsomely finished catalog which announces a new development in brass castings. These castings are designated under the name of "Do-Di" and are produced by a patented process which is distinctly different from the regular die casting process. These castings

are now being produced by the company for a great variety of uses and are claimed to be giving entire satisfaction. Do-Di castings fully meet the Society of Automobile Engineers' specifications No. 29 for manganese bronze castings, which calls for upwards of 70,000 pounds tensile strength per square inch.

Boronic Products—The American Boron Products Company, Inc., Reading, Pa., has issued a very interesting booklet giving full description for the use of their Boronic alloying metals in the manufacture of metallic alloys. In this booklet the company defines the treatment of metals, whether precious or common, with Boronic products as meaning to cleanse them from oxides, to harden them, to increase their tensile strength, to render the whole melt more homogenous and uniform and to generally improve the texture of all metals in which they enter. Boronic metals, it is stated, act by liberating gases which combine with and reduce to metallic form any oxides that may be present. The gases in their effrts to do this cause a stirring or mixing of the melt, thus producing a uniform and homogenous casting. The boklet also contains a number of photo-micrographs, showing the egects of Boronic products on several of the metals such as aluminum, copper, and copper-nickel alloys. Copies may be had upon request.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL STOCKS MARKET QUOTATIONS

	Par.	Bid.	Asked.
Aluminum Company of America	$100	$500	$575
American Brass	100	214	219
American Hardware Corp.	100	140	145
Bristol Brass	25	33	35
International Silver, com.	100	23	25
International Silver, pfd.	100	87	92
New Jersey Zinc	100	253	256
Rome Brass & Copper	100	290	330
Scovill Mfg. Co.	100	355	375
Yale & Towne Mfg. Co.	...	230	240

Corrected by J. K. Rice, Jr., & Co., 26 Wall street, New York.

METAL MARKET REVIEW

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE.

COPPER.

MAY 12, 1919.

Improved sentiment in the copper industry, noted last month, was in continued evidence during April, although the total volume of business transacted was much smaller. Price fluctuations were within a range of ⅜c. per pound, of which ¼c. per pound was lost with a later recovery of ⅛c., while at the close a net decline of ⅛c. was represented—from the prices prevailing at the opening—in 15.62½c. for prime Lake, 15.37½c. for electrolytic, 15c. for casting copper. In sharp contrast to March transactions was the April dullness, total sales for domestic consumption being estimated at between 25,000,000 to 30,000,000 pounds while export business was between 10,000,000 and 15,000,000 pounds as compared with combined domestic and export sales of 75,000,000 pounds in the preceding month. While stocks of copper are large, they are in very strong hands and it is believed no pressure to effect sales will be made. Cost of production is in many instances reported as being higher than present selling price. It was pointed out that today's prices are relatively at a very low point, the lowest of record in the industry being in 1894, when with prime Lake at an average of 9.60c. and electrolytic at an average of 9.43c. for that year, a majority among copper producing companies were able to earn and to pay dividends, because of the low cost of production. Heavily increased transportation charges on smelter products and the labor wage are large factors in present costs, the former being increased in some cases 170 per cent and the latter 75 per cent. A confident feeling is very generally expessed among producers, however, who do not expect any large resumption of business before the second half of the year, when industrial adjustment, it is believed, will have proceeded to such an extent as to release copper requirements that have been accumulating for so long both at home and abroad.

TIN.

The tin market in April was stagnant but hopefully awaiting the passing of Government restrictions which it was confidently expected by some in the trade would transpire not later than June 1. No information as to stocks remaining in the hands of the United States Steel Products Company, on Government account, became available, but as no arrivals during the month have been reported, it was understood that the entire purchases made under Tin Control have been received. American pure tin, after having been withdrawn from the market by request of the Chief of Tin Control in March, was again being quoted, late in April, at 71.50c. per pound. Straits tin was, of course, still quoted at the Government's fixed price, 72.50c., while any outside lots were held at the same figure. Practically, the market was dead. Importations of metal to be shipped either from London or from the Far East, when restrictions have been removed, ranged in price around 48.50c. to 49c., during the month. Toward the close, English L. & F. tin could be ordered at 48.25c. to 48.37½c. for delivery after the expiration of Government control. A few small lots of 99 per cent American tin became available after April 25, at 71c., but at the close these lots had all disappeared.

LEAD.

Opening prices of lead in April were at the March closing figures, 5c. East St. Louis, 5.25c. New York, not only in the outside market but as the base of the American Smelting & Refining Company. In the second week, the Bureau of Mines announced War Department stocks of 24,000,000 pounds, and the market remaining stagnant, the leading producer reduced its base to 4.75c. East St. Louis, 5c. New York. The outside market on the following day declined to the same figures. An unusual feature was noted, in offerings of Mexican lead in this market in competition wtih domestic production, due to the large surplus stocks held abroad and which make the prospect for exportation very unpromising, at least until those stocks have been disposed of. No export demand is expected by American producers for months to come. During the second fortnight the market was stagnant, and at the close a further weakening in prices was evident in quotations of 4.60c. East St. Louis, 4.85c. New York, in the outside market, while the basis of the leading producer remained at 4.75c. East St. Louis, 5c. New York.

SPELTER.

The spelter market in April, after opening at an advance of 5 points to 6.25c. East St. Louis, 6.60c. New York, gradually rose to 6.32½c. East St. Louis, 6.67½c. New York, before the end of the first week. Dullness, however, speedily developed following the rejection of the agreed upon prices of steel and iron by the Railroad Administration. After the appearance of Government surplus stocks in the market, prices steadily declined to the lowest figures of the month, 6.05c. East St. Louis, 6.40c. New York, for prompt and early prime Western. June and July shipments being held at an advance of 2½ points to 5 points over prompt and early prices. Brass special for prompt delivery was offered at 6.15c., and grade A was in the market at 6.75c. per pound. A considerable volume of business was transacted in primary spelter at the lowest figures and by April 23 an advance was made to 6.42½c. New York—6.07½c. being the East St. Louis figures. Thereafter, there was no change until the last day, when prices again declined to 6.05c. East St. Louis, 6.40 New York, the total decline amounted to 20 points.

ALUMINUM.

Advanced prices and improved tendencies marked the aluminum market in April. Expected importations from France failed to arrive and some scarcity of metal was noted. Prices which at the beginning were 28-30c. for virgin 98-99 per cent, 27-29c. for remelted 98-99 per cent., and 23-25c. for remelted No. 12, advanced on the next day 1c. higher, on the three varieties. Under the influence of continued and increasing demand, bidding prices by the 25th were 31c. for virgin, 29; for 98-99 per cent remelted, and 25c. for No. 12 remelted, while asking prices were 2c. per pound higher. The total advance during the month was 3c. per pounds and the scarcity in supplies was increasing.

ANTIMONY.

The market in April, on substantial buying, opened at an advance of ⅛c. to 6.62½c. for prompt and nearby metal in wholesale lots and at 6.75c. for spot jobbing lots. On the strength of more favorable statistics published early, another ⅛c. advance occurred before the end of the first fortnight, but with a falling off in demand this was lost a few days later, the market remaining at a standstill until in the last week when buying for future shipments from the Orient stimulated demand to such an extent that another advance carried prices to 7c. for prompt and early shipment, with jobbing lots held at 7.12½c. April and May shipments from the Orient, at the close, were being placed at 6.87½c. per pound. The net advance from the March closing price amounted to ½c. per pound.

SILVER.

The price of silver remained unchanged at 101⅛c. throughout April. The Treasury statement, as of April 1, 1919, announced stocks of standard silver dollars amounting to $328,434,930 as compared with stocks of $568,269,513 on April 1, 1918. The Government control over the domestic market for silver bars ceased on May 1, and the generally accepted opinion is that the official prices of commercial bars will advance because of scarcity of white metal, reduced production and active demand.

QUICKSILVER.

After the heavy decline in prices of quicksilver to $68 per flask in March, the rapid advance in April to $75 per flask of 75 pounds each, came as a surprise to the trade generally, but was accounted for by the clearance from the market of surplus stocks at the lower prices. Production has been falling off, from various causes, for more than a year.

PLATINUM.

The price of platinum remained unchanged at $100 per ounce throughout April, with the demand from jewelers increasing, while other consuming demand was steady and in considerable volume.

OLD METALS.

Stagnation in the markets for major metals was reflected by dullness in old metals during April—orders received being mainly of the "hand-to-mouth" variety. Large lots of Government materials offered from time to time, were added to by offerings of surplus from rolling mills and brass works, the abundant supply having a tendency to check buying. Unsettled negotiation in Paris also had a disquieting influence. Notwithstanding these drawbacks, prices were firmly maintained. The aluminums were in active demand, particularly during the second fortnight, and registered an advance of 3c. per pound to 20c. on old cast and on old sheets, while new aluminum scrap was up 1c. to 22c. per pound. The coppers advanced ¾c. to 13.50c. for strictly crucibled; to 11c. for light copper, and to 12.50c. for uncrucibled wire. Brass clippings advanced ¼c. to 8.75c. While no export orders were placed, there were some such inquiries in the market toward the end of the month.

WATERBURY AVERAGE

Lake Copper Average for 1918, 24.75. 1919—January, 23.00. February, 18.00. March, 15.50. April, 15.50.

Brass Mill Spelter. Average for 1918, 9.858. 1919—January, 9.00. February, 8.20. March, 8.00. April, 6.90.

APRIL MOVEMENTS IN METALS

Copper:	Highest.	Lowest.	Average.
Lake	16.00	15.50	15.726
Electrolytic	15.50	15.25	15.399
Casting	15.30	14.87½	15.064
Tin	72.50	71.00	72.263
Lead	5.25	5.00	5.067
Spelter (brass special)	6.40	6.10	6.245
Antimony	7.00	6.62½	6.825
Aluminum	33.00	29.00	30.667
Quicksilver (per flask)	$75.00	$68.00	$72.333
Silver (cts. per oz.)	101⅛	101⅛	101⅛

INQUIRIES AND OPPORTUNITIES

Under the directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. page.

Metal Prices, May 12, 1919

NEW METALS

	Cents.
COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER. Manufactured 5 per centum.	
Electrolytic, carload lots	15⅜
Lake, carload lots	15⅝
Casting, carload lots	15
TIN—Duty Free.	
Straits or Australian, carload lots	72½
LEAD—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots	5
SPELTER.—Duty 15%.	
Brass Special ..... nominal	6½
Prime Western, carload lots	6.35
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	....
100-lb. f. o. b. factory	....
Ton lots, f. o. b. factory	32.00
ANTIMONY—Duty 10%.	
Cookson's, Hallet's or American	Nominal
Chinese, Japanese, Wah Chang WCC, brand spot	7⅛
NICKEL—Duty Ingot, 10%. Sheet, strip and wire, 20% ad valorem.	
Ingot	40c.
Shot	43c.
ELECTROLYTIC	45c.
MANGANESE METAL	Nominal
MAGNESIUM METAL—Duty 20% ad valorem (100 lb. lots)	$1.90
BISMUTH—Duty free ..... nominal	$3.50
CADMIUM—Duty free ..... nominal	$1.45
CHROMIUM METAL—Duty free ..... nominal	
COBALT—97% pure	$3.00
QUICKSILVER—Duty 10% per flask of 75 pounds	$77.00
PLATINUM—Duty free, per ounce	$100.00
SILVER—Government assay—Duty free, per ounce	$1.01⅛
GOLD—Duty free, per ounce	$20.67